Table 6-81. Estimated propagation of noise (dBA) from the operation of a waste transport train with two locomotives in communities near the Valley Modified Corridor.[a]

Corridor/community	Distance (kilometers)[a]	Estimated noise (dBA)[b]
Valley Modified		
North Las Vegas	1	57
Indian Springs	1.6	48.1
Cactus Springs	1.8	45.5
Indian Springs Alternate		
Indian Springs	2[c]	43.1
Cactus Springs	4[c]	27.6
Mercury[d]	2[c]	43.1

a. To convert kilometers to miles, multiply by 0.62137.
b. Estimated values do not include noise loss due to interactions with the ground that could account for decreases in estimated noise levels of from 10 to 20 dBA at 100 meters (330 feet) from the tracks.
c. Noise estimates at distances greater than 2 kilometers (1.2 miles) have large uncertainty.
d. Federal installation.

6.3.2.2.5.9 Valley Modified Rail Utilities, Energy, and Materials

Table 6-82 lists the use of fossil fuels and other materials in the construction of a Valley Modified branch rail line.

Table 6-82. Construction utilities, energy, and materials for a Valley Modified branch rail line.

Route	Length (kilometers)[a]	Diesel fuel use (million liters)[b]	Gasoline use (thousand liters)	Steel (thousand metric tons)[c]	Concrete (thousand metric tons)
Valley Modified	160	13 - 14	270 - 280	22 - 23	130

a. To convert kilometers to miles, multiply by 0.62137.
b. To convert liters to gallons, multiply by 0.26418.
c. To convert metric tons to tons, multiply by 1.1023.

6.3.3 IMPACTS OF NEVADA HEAVY-HAUL TRUCK TRANSPORTATION IMPLEMENTING ALTERNATIVES

This section describes the analysis of human health and safety and environmental impacts for five implementing alternatives that would employ heavy-haul trucks to transport rail shipping casks containing spent nuclear fuel and high-level radioactive waste in Nevada. DOE has identified five highway routes in Nevada for potential use by the heavy-haul trucks to transport the casks. The casks would be transported to the repository from an intermodal transfer station along a mainline railroad where they would be loaded onto the heavy-haul trucks from railcars. The trucks would also transport empty casks from the repository back to the intermodal transfer station for loading back onto railcars.

INTERMODAL TRANSFER STATION AND NAVAL SPENT NUCLEAR FUEL

Under the mostly legal-weight truck scenario, DOE would use the services of a commercial intermodal operator for the transfer of naval spent nuclear fuel shipments. This EIS assumed that DOE would not build an intermodal transfer station to handle those shipments. Because only 300 naval spent nuclear fuel casks would arrive in Nevada by rail over 24 years, the impacts of intermodal transfer operations would be considerably less than those for the mostly rail scenario. On average, the intermodal transfers would occur for about 2 weeks every 5 months to remove five casks from each train shipment. A staff of 20 would work only during these rail shipments.

DOE would locate an intermodal transfer station at one of three potential locations in Nevada near existing rail lines and highways: (1) near Caliente, (2) northeast of Las Vegas (Apex/Dry Lake), or (3) southwest of Las Vegas (Sloan/Jean). Caliente is the originating location for three of the routes that heavy-haul trucks could use to ship spent nuclear fuel and high-level radioactive waste to the repository. There is one potential route each associated with the Apex/Dry Lake and Sloan/Jean locations (Figure 6-20).

For convenience and as shown in the figure, the five highway routes have been named the Caliente, Caliente/Chalk Mountain, Caliente/Las Vegas, Apex/Dry Lake, and Sloan/Jean routes. DOE considers these routes to be feasible for heavy-haul trucks to use in transporting large rail casks to and from the repository. The routes were compiled from a selection of highways in Nevada that the State has designated for use by heavy-haul trucks (DIRS 155347-CRWMS M&O 1999, Request #046). They include highways that were identified in a study by the College of Engineering at the University of Nevada, Reno, for the Nevada Department of Transportation (DIRS 103072-Ardila-Coulson 1989, all). This study provided a "preliminary identification of Nevada highway routes that could be used to transport current shipments of Highway Route-Controlled Quantities of Radioactive Materials and high-level radioactive waste." They also include highways studied by the Transportation Research Center at the University of Nevada, Las Vegas, that characterized "rail and highway routes which may be used for shipments of high-level nuclear waste to a proposed repository at Yucca Mountain, Nevada" (DIRS 103462-Souleyrette, Sathisan, and di Bartolo 1991, all).

This section evaluates impacts in Nevada for each route and associated intermodal transfer station. The evaluation addresses (1) upgrading highways to accommodate frequent heavy-haul truck shipments, (2) constructing and operating an intermodal transfer station, and (3) making heavy-haul truck shipments. With the exception of Interstate System Highways, upgrades to existing Nevada highways would be necessary to accommodate the heavy-haul trucks.

The analysis of impacts for each of the five Nevada heavy-haul truck implementing alternatives assumed the national mostly rail transportation scenario. Therefore, the analysis included the impacts of legal-weight truck transportation from six commercial generators that do not have the capability to handle or load a large rail cask. About 1,079 legal-weight truck shipments would enter Nevada and travel to the repository. These trucks would use the same transport routes and carry about the same amounts of spent nuclear fuel per shipment as those for the mostly legal-weight truck scenario discussed in Section 6.3.1.

The analysis evaluates impacts for the following environmental resource areas: land use and ownership; air quality; hydrology; biological resources and soils; cultural resources; occupational and public health and safety; socioeconomics; noise and vibration; aesthetics; utilities, energy, and materials; and waste management.

Section 6.3.4 discusses the potential for transportation activities to cause environmental justice impacts in Nevada.

6.3.3.1 Impacts Common to Nevada Heavy-Haul Truck Implementing Alternatives

Nevada highways upgraded for heavy-haul truck use would allow routine, safe use in year-round operations. Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make the highways susceptible to damage by heavy vehicles (frost-restricted areas). In addition, new turnout lanes at frequent intervals along two-lane highways would allow other traffic to pass the slower heavy-haul vehicles. Highway shoulders would be widened and road surfaces would be improved in many areas. Interstate highways would not be improved because they already meet standards that upgrades to other Nevada highways for heavy-haul truck shipments would follow.

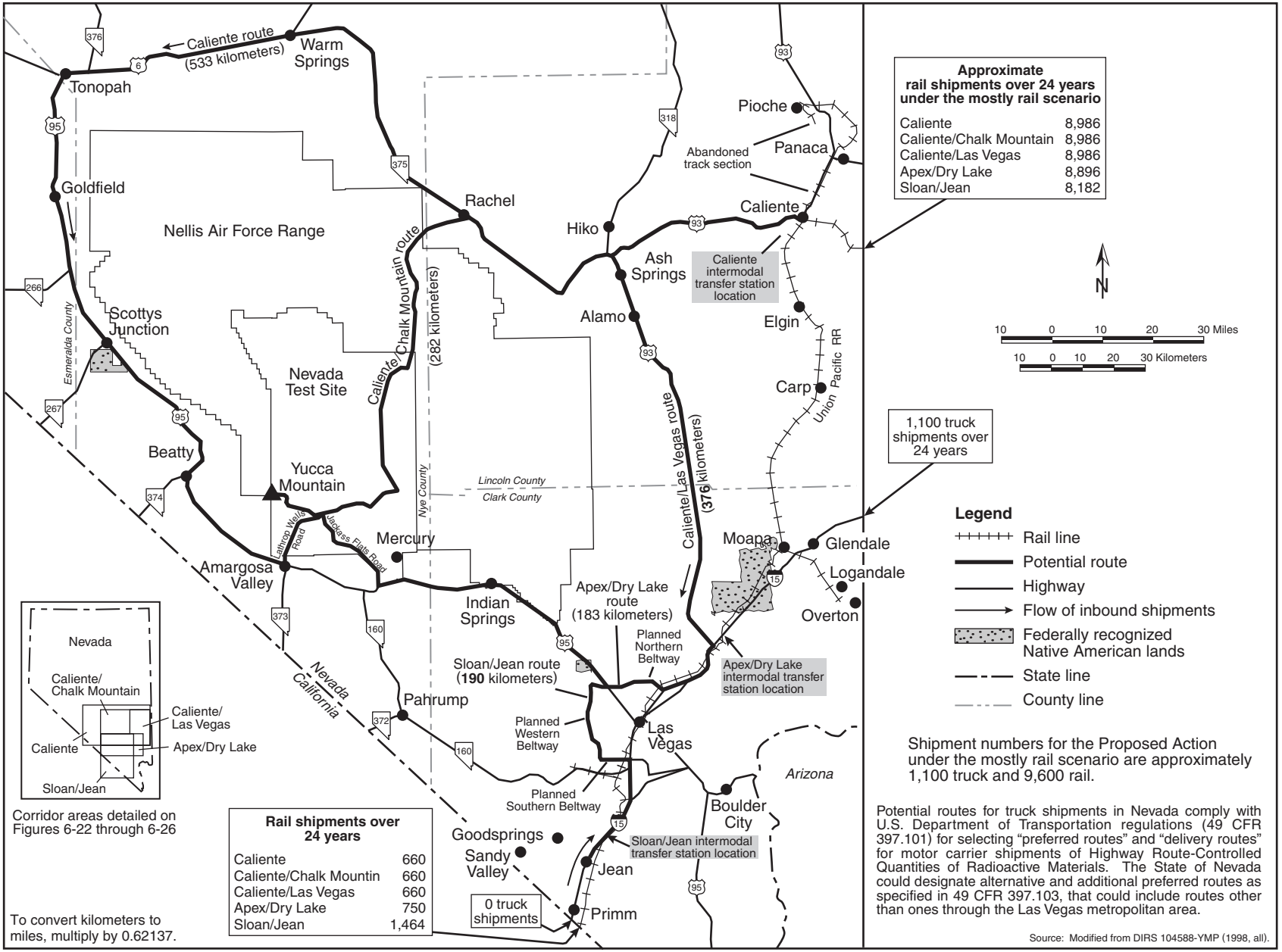


Figure 6-20. Potential routes in Nevada for heavy-haul trucks and estimated number of shipments for each route.

Even with the highway upgrades, heavy-haul trucks would cause delays for other vehicles because of their size and slower travel speeds. On most of the highways in Nevada that heavy-haul shipments would use, traffic volumes are classified as *level of service Class A* (DIRS 103255-CRWMS M&O 1999, p. 3-11), which means that traffic flows freely without delay (see Chapter 3, Section 3.2.2.2.11, for a description of all levels of service). The addition of 11 round trips each week to the traffic flow on these highways would not lead to a change in the average level of service. However, some traffic in lanes traveling with the vehicles would experience delays and short queues could form between turnout areas. In congested areas, such as the Las Vegas metropolitan area, where the level of service for the planned Las Vegas Beltway could be Class C or lower during non-rush-hour times, large slow-moving vehicles with their accompanying escort vehicles could present a temporary but large obstruction to traffic flow. Because disruptions on congested highways often continue after the removal of the cause, the duration of a traffic flow disruption would be longer than the time the vehicle would travel on the highway.

An intermodal transfer station would be common to all five heavy-haul truck implementing alternatives. Figure 6-21 shows the locations in Nevada that DOE is considering for such a station. Station construction would take about 18 months. The station would be a fenced area of about 250 by 250 meters (820 by 820 feet) and a rail siding that would be about 2 kilometers (1.25 miles) long. The estimated total area occupied by the facility and support areas would be 200,000 square meters (50 acres). It would include rail tracks, two shipping cask transfer cranes (one on a gantry rail and a backup rubber-tired vehicle), an office building, and a maintenance and security building. It would also have connecting tracks to an existing mainline railroad and storage and transfer tracks inside the station boundary. The maintenance building would provide space for routine service and minor repairs to the heavy-haul trailers and tractors. The station would have power, water, and other services. Diesel generators would provide a backup electric power source. The station would have the capacity to allow an intermodal transfer rate of 22 rail casks a week (11 loaded casks to the repository, 11 empty casks returned to the commercial and DOE sites).

Operations at an intermodal transfer station would include switching railcars carrying spent nuclear fuel and high-level radioactive waste casks from mainline railroad trains to the station's side track; queuing railcars on the side track for movement to the intermodal transfer area; moving railcars carrying loaded casks from the side track into position to transfer the casks to heavy-haul trucks; and using the facility crane to transfer loaded casks from railcars to heavy-haul trucks. The station would reverse this sequence of operations for empty casks returning from the repository.

The estimated life-cycle cost to construct and operate an intermodal transfer station and to operate heavy-haul trucks in Nevada would range from $387 million to $669 million (2001 dollars), depending on the alternative.

This section discusses impacts for the analysis areas that would be common to all five heavy-haul truck implementing alternatives. It includes impacts for upgrading Nevada highways for use by heavy-haul trucks, constructing and operating an intermodal transfer station, and heavy-haul truck transportation of shipping casks, both loaded and empty. DOE evaluated these impacts as described in Section 6.3. Section 6.3.3.2 discusses impacts that would be unique to each heavy-haul truck transportation implementing alternative.

6.3.3.1.1 *Common Route Land Use and Ownership Impacts*

Intermodal Transfer Station Construction. Land-use impacts from an intermodal transfer station would center on the station itself because the railroad lines and the highways that DOE would use already exist and their intended use would not change. The construction of an intermodal transfer station would change the land uses and ownership (organizational control) of about 0.2 square kilometer (50 acres) of property. This land would become the responsibility of DOE or possibly a transportation operating

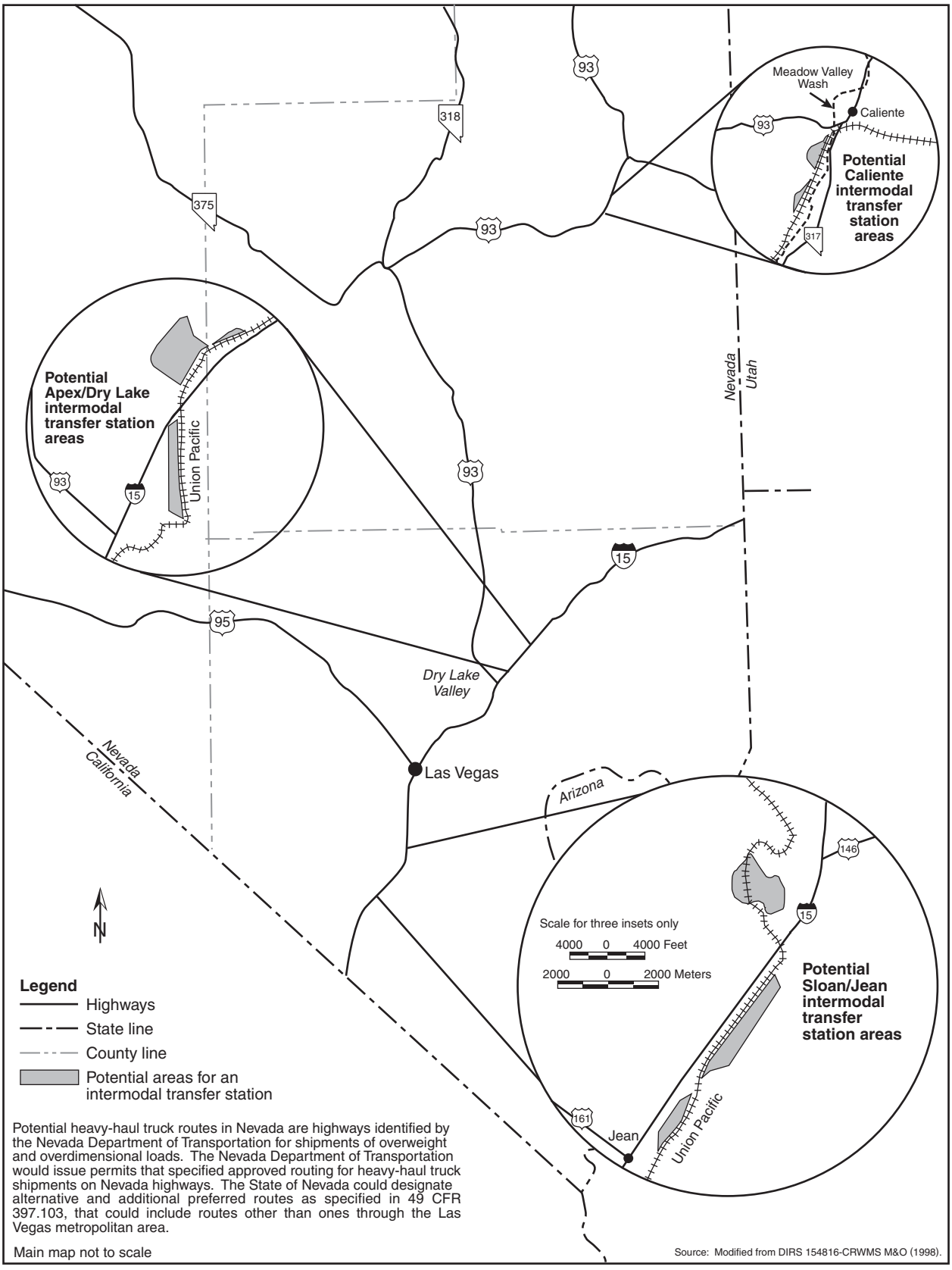


Figure 6-21. Potential locations for an intermodal transfer station.

company. An intermodal transfer station would be in an area used for industrial and commercial activities or adjacent to existing roads and railways. Because the land area would be small, fencing around an intermodal transfer station would have no significant impacts on other land uses. Because of the station's use and proximity to industrial and commercial facilities or existing roads and rail lines, land use impacts would be small. DOE would build a Caliente intermodal transfer station, located near the entrance to Kershaw-Ryan State Park, on lands currently used for industrial and commercial purposes. Because of this, there should be no additional impact to land use.

Heavy-Haul Truck and Intermodal Transfer Station Operations. Intermodal transfer station operations (arriving and departing trains, arriving and departing heavy-haul trucks, intermodal transfers, and maintenance and inspection activities) would be confined to the same areas that were disturbed during construction, so no additional land disturbance would take place. There would be no significant impacts to land use of the proposed facility locations. Only limited land-use impacts would result from heavy-haul truck operations on Nevada highways. Erosion along these highways would be managed as it is now. Because new road construction would not be needed, additional land and soil disturbance would occur only along existing roads and within existing rights-of way. Other land-use and ownership impacts would differ among the implementing alternatives. These impacts are described in Section 6.3.3.2.

6.3.3.1.2 *Common Route Air Quality Impacts*

The emissions of criteria pollutants [carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (PM_{10}), lead, and ozone] are regulated under the Clean Air Act. Ozone would not be directly released during heavy-haul truck route construction and operation activities. However, ozone precursors (nitrogen dioxide and volatile organic carbon compounds) would be released due to fuel use by construction equipment. The estimated annual emission rates of nitrogen dioxide and volatile organic carbon compounds would be small in comparison with regulatory standards (40 CFR 52.21). In addition, lead emissions would not result from heavy-haul truck route construction and operation activities. The construction and operation activities discussed in this section would not be a significant source of ozone or lead.

DOE conducted a conformity review using the guidance in DIRS 155566-DOE (2000, all) for transportation activities under the heavy-haul truck implementing alternative. This review focused on the emission of carbon monoxide and PM_{10}. The Las Vegas air basin is in nonattainment status for carbon monoxide, which is largely a result of on-road sources (DIRS 156706-Clark County 2000, Appendix A, Table 1-3). During construction, transportation of personnel, materials, and supplies; construction of an intermodal transfer station; and highway construction and upgrade activities in the nonattainment area (including accelerated construction of the Las Vegas Beltway) would result in carbon monoxide emissions in the nonattainment area. During operations, transportation of personnel, materials, and supplies and transportation of spent nuclear fuel and high-level radioactive waste would result in carbon monoxide emissions in the nonattainment area. The review determined that during the construction phase total carbon monoxide emissions would exceed the General Conformity threshold level in the nonattainment area only for the Caliente/Las Vegas route (110 percent of threshold). All other nonattainment area construction and operations emissions in the nonattainment area would not exceed the General Conformity threshold level. The maximum emissions would be 100 metric tons (110 tons) per year (110 percent of threshold) during construction ; this estimate is 0.11 percent of the 2000 daily carbon monoxide inventory of the Las Vegas air basin. Maximum total emissions during operations would be 73 metric tons (80 tons) per year (80 percent of threshold); this estimate is 0.08 percent of the 2000 daily carbon monoxide inventory of the Las Vegas air basin.

The Las Vegas air basin is also in nonattainment status for PM_{10}, which is largely a result of construction activities (DIRS 155557-Clark County 2001, Tables 3-8 and 5-3). The conformity review determined that the fugitive dust emissions from the construction of the intermodal transfer facilities and highway

construction and upgrade activities in the nonattainment area (including accelerated construction of the Las Vegas Beltway) would just exceed General Conformity threshold levels for the Caliente/Las Vegas route (100 percent of threshold). The maximum emissions would be 66 metric tons (73 tons) per year (100 percent of threshold) during construction; this estimate is 0.04 percent of the annual and daily 2001 PM_{10} inventory of the Las Vegas air basin.

The General Conformity Threshold levels are exceeded for carbon monoxide (110 percent of threshold) and PM_{10} (100 percent of threshold) during construction of the Caliente/Las Vegas route. The above-threshold emissions would occur over a 1.2-year period in the nonattainment area. During the remaining construction time for this route, construction activities and, therefore, emissions would occur largely outside the nonattainment area. Outside the nonattainment area, emissions levels would be significantly below the Prevention of Significant Deterioration levels (carbon monoxide—43 percent of threshold and PM_{10}—29 percent of threshold).

The DIRS 155112-Berger (2000, p. 56) estimate for transportation of radioactive materials only for heavy-haul truck transport for 2020 is 0.54 metric ton (0.59 ton) per day. The Berger estimate is largely the result of emissions from collateral traffic congestion. Although DOE believes the estimate is high, a value of 0.54 metric ton per day, 11 round trip shipments per week, 52 weeks per year, would result in about 123 metric tons (135 tons) of carbon monoxide per year, which would exceed the 91 metric tons (100 tons) per year General Conformity threshold, but would be 0.08 percent of the annual and daily 2001 PM_{10} inventory of the Las Vegas air basin.

Highway Construction and Upgrades. Construction and upgrade activities would occur in Nevada along any of the five heavy-haul alternatives (see disturbed area estimates under the Land Use and Ownership discussions in Section 6.3.3.2. These activities would result in the release of criteria pollutants. Fuel consumption during construction activities would result in releases of criteria pollutants [carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter (PM_{10})]. Construction activities would also release particulate matter in the form of fugitive dust from such activities as excavation and truck traffic. The analysis for the three heavy-haul truck routes that would pass through the Las Vegas Valley air basin included acceleration of the Las Vegas Beltway project from its scheduled completion in 2020 to a completion date of 2010.

Most of the road upgrades would occur in areas that are in attainment for all criteria pollutants. If construction activities were conducted in the Las Vegas Basin, which is in nonattainment for PM_{10} and carbon monoxide, additional measures would be necessary to reduce the PM_{10} and carbon-monoxide emissions, in accordance with the Clark County PM_{10} State Implementation Plan (DIRS 155557-Clark County 2001, all). Appendix G, Section G.1.4.1, describes the method used to determine PM_{10} emissions from earthmoving activities. This method takes no credit for dust suppression measures. However, the analysis assumed dust suppression for the transportation construction emissions described here and in the conformity review; dust suppression was assumed to reduce PM_{10} emissions by 70 percent. Appendix G, Section G.1.4.5, describes the method used to determine criteria pollutant emissions from construction vehicle activity. Fuel consumption from route-specific construction vehicle use is assumed to be:

Caliente/Las Vegas route:	5.5 million liters (1.5 million gallons) diesel fuel, 110,000 liters (29,000 gallons) gasoline over 46 months
Sloan/Jean route:	1.7 million liters (450,000 gallons) diesel fuel, 29,000 liters (7,700 gallons) gasoline over 48 months
Apex/Dry Lake route:	1.6 million liters (420,000 gallons) diesel fuel, 25,000 liters (7,400 gallons) gasoline over 28 months

Accelerated Northern Beltway:	1.9 million liters (500,000 gallons) diesel fuel, 35,000 liters (9,200 gallons) gasoline over 28 months (add these emissions to Caliente/Las Vegas and Apex/Dry Lake results)
Accelerated Southern and Western Beltway:	3.9 million liters (1 million gallons) diesel fuel, 72,000 liters (19,000 gallons) gasoline over 48 months (add these emissions to Sloan/Jean results)

However, activities at any location would generate transient emissions that would be spread over a very large area because construction would be a moving source along various portions of the route. Construction activities in or near the nonattainment area would include intermodal transfer facility construction at Sloan/Jean and Apex/Dry Lake; highway upgrade activities for the Caliente/Las Vegas, Sloan/Jean, and Apex/Dry Lake routes; and accelerated Las Vegas Beltway construction.

Intermodal Transfer Station Construction. Construction of an intermodal transfer station would also generate emissions of criteria pollutants from fuel use and earthmoving activities. Each heavy-haul truck route would require the construction of such a facility. The Caliente intermodal transfer station could serve the Caliente, Caliente/Chalk Mountain, or Caliente/Las Vegas route. The Caliente station would be in an area in attainment of the National Ambient Air Quality Criteria (attainment area) and construction emissions would adhere to the Prevention of Significant Deterioration regulations (40 CFR 52.21). The Sloan/Jean or Apex/Dry Lake station would be in or near the Las Vegas Basin PM_{10} and carbon monoxide nonattainment area. New stationary emission sources in nonattainment areas are regulated under the General Conformity Rule (40 CFR 93.153).

Table 6-83 lists estimated annual emissions from the construction of an intermodal transfer station. These estimates would apply to each of the three potential site areas. Building an intermodal transfer station would disturb about 0.2 square kilometer (50 acres) over 18 months. Construction of the station would require about 130,000 liters (34,000 gallons) of diesel fuel and about 2,600 liters (690 gallons) of gasoline. The analysis used the method described above for highway construction and upgrades to estimate emissions from earthmoving and fuel use.

Table 6-83. Annual criteria pollutant releases from construction of an intermodal transfer station (kilograms per year).[a]

Pollutant	Construction emission (annual)	PSD limit[b]	Percent of limit[b]	GCR[c] emission threshold	Percent of GCR emission threshold
Nitrogen dioxide	3,400	230,000	1.4	NA[d]	NA
Sulfur dioxide	320	230,000	0.14	NA	NA
Carbon monoxide	2,100	230,000	0.91	91,000	2.3
PM_{10}	9,400	230,000	4.1	64,000 (serious)	15

a. To convert kilograms to tons, multiply by 0.0011023.
b. Prevention of Significant Deterioration (40 CFR 52.21).
c. GCR = General Conformity Rule (40 CFR 93). Applies for releases of pollutants in areas in nonattainment.
d. NA = not applicable.

Table 6-83 lists the percentage of each pollutant in relation to the Prevention of Significant Deterioration limit and the General Conformity Rule emission threshold. The estimated annual releases from the construction of the intermodal transfer station would be almost 4 percent of the Prevention of Significant Deterioration limit and 15 percent of the General Conformity Rule emission threshold (see 40 CFR 93) for PM_{10} and 2.3 percent for carbon monoxide. Construction activities in the Las Vegas nonattainment area would have to follow more stringent fugitive dust (PM_{10}) control measures described in the Clark County PM_{10} State Implementation Plan (DIRS 155557-Clark County 2001, all).

Heavy-Haul Truck and Intermodal Transfer Station Operations. Operations at the intermodal transfer station would include locomotive and heavy-haul truck emissions. Fuel use by heavy-haul trucks would result in emissions of carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM_{10}. Based on the Federal standards for switch locomotives (40 CFR 92.006), there are no emission standards for sulfur dioxide. The locomotive would operate about 30 hours per week at the intermodal transfer station. The pollutant concentration in the area around the route would increase slightly during the passage of the heavy-haul trucks but would not exceed the General Conformity thresholds. About 11 heavy-haul trucks per week would travel to and from the intermodal transfer station.

Table 6-84 lists estimated annual emissions from the operation of an intermodal transfer station. These estimates would apply to each location.

Table 6-84. Annual emissions of criteria pollutants from operation of an intermodal transfer station over 24 years (kilograms per year).[a]

Pollutant	Operation[b] emissions (annual)	PSD limit[c]	Percent of PSD limit	GCR[d] emission threshold	Percent of GCR emission threshold
Nitrogen dioxide	38,000	230,000	17	NA[e]	NA
Sulfur dioxide	(f)	230,000	(f)	NA	NA
Carbon monoxide	11,000	230,000	4.8	91,000	12
Particulate matter (PM_{10})	1,100	230,000	0.48	64,000	1.7

a. To convert kilograms to tons, multiply by 0.0011023.
b. Operations emissions from a switchyard locomotive and heavy-haul trucks.
c. PSD limit = Prevention of Significant Deterioration definition of a major stationary source (40 CFR 52.21); applies for releases of criteria pollutants during operation.
d. GCR = General Conformity Rule (40 CFR Part 93); applies for releases of pollutants in areas in nonattainment.
e. NA = not applicable.
f. 40 CFR 92.006 does not define sulfur dioxide emission standards for locomotives.

The estimated annual releases for the operation of the intermodal transfer station would be about 17 percent or less of the definition of a major stationary source (see Chapter 3, Section 3.1.2.1, or 40 CFR 52.21). The operation of a midroute stopover would result only in small releases of pollutants.

The operation of a yard locomotive would not emit ozone directly, but would emit ozone precursors (nitrogen dioxide and hydrocarbons). The estimated annual releases of the ozone precursors would be small; nitrogen dioxide would be about 17 percent of a major stationary source. Therefore, DOE does not expect the operation of the intermodal transfer facility to be a significant source of ozone.

Because the shipping casks would not be opened, there would be no radiological air quality impacts from normal operations at an intermodal transfer station.

Other air quality impacts would differ among the implementing alternatives (see Section 6.3.3.2).

6.3.3.1.3 *Common Route Hydrology Impacts*

This section describes impacts common to the five heavy-haul truck implementing alternatives (including upgrades to Nevada highways and construction of a midroute stopover and an intermodal transfer station at one of three locations) for surface water and groundwater.

Surface Water

Highway Construction and Upgrades. For road improvement work and construction of a midroute stopover, a contractor could place fuel tank trucks or trailers along the route to support equipment operations. Such a practice would present some potential for spills and releases. As long as the

contractor met the regulatory requirements for reporting and remediating spills and properly disposing of or recycling used materials, the probability of unrecovered spills due to negligence or improper work practices would be low. If a release occurred, the potential for chemical contaminants (principally petroleum products) to enter flowing surface water before cleanup would be the largest risk. Surface-water resources along routes for heavy-haul trucks and in the vicinity of intermodal transfer station sites are identified in Chapter 3, Section 3.2.2.2.3. Among all the routes and station sites, three identified surface-water resources cross or run immediately adjacent to a route and two others are as close as 10 to 30 meters (30 to 100 feet). Otherwise, all of the identified surface-water resources are at least 100 meters (330 feet) from the existing roads or intermodal transfer station sites. Two of the station sites and their associated routes for heavy-haul trucks (Sloan/Jean and Apex/Dry Lake) have no identified surface-water resources within 1 kilometer (0.6 mile). The potential for released contaminants to reach flowing surface water would be very low.

A portable asphalt plant to support roadway improvement work would be located along the paving area. Aggregate crushing plants would be located in borrow areas. DOE assumes that the borrow areas would be those normally used by the Nevada Department of Transportation. Spills and releases of asphalt materials, which are predominantly petroleum products but include chemical additives, could occur in the course of operating an asphalt plant. Spill reporting and remediation requirements would be in place for these operations, as described above. Once asphalt was in place, it would be susceptible to minor leaching or bleeding while it cured, similar to the leaching or bleeding that occurs during road construction for other highway projects.

Intermodal Transfer Station Construction. Potential impacts to surface water would include (1) the possible spread of contamination by precipitation, intermittent runoff events, or, where present, releases to flowing water in the single perennial stream, and (2) the alteration of natural drainage patterns or runoff rates that could affect downgradient resources.

Materials that could contaminate surface water would be present during construction; these would consist primarily of petroleum products (fuels and lubricants) and coolants (antifreeze) to support equipment operations. There would not be much bulk storage of these materials. Fuel for vehicles would be purchased from nearby commercial vendors. Minor amounts of building materials such as paints, solvents, and thinners could be present during construction.

The construction of an intermodal transfer station would include stormwater runoff control, as necessary; the completed station would have a stormwater detention basin. These measures would minimize the potential for contaminated runoff to reach a stream.

Appendix L contains a floodplain/wetlands assessment that examines the effects of highway route construction, operation, and maintenance (see Section L.4.1) on the following floodplains in the vicinity of Yucca Mountain: Fortymile Wash, Busted Butte Wash, Drill Hole Wash, and Midway Valley Wash. There are no delineated wetlands at Yucca Mountain.

The assessment in Appendix L compares what is known about the floodplains, springs, and riparian areas at the three candidate intermodal transfer station sites (see Sections L.3.2.6, L.3.2.7, L.3.2.8, and L.4.2.2). In general, wetlands have not been delineated at the three sites. The Appendix L assessment does not evaluate potential floodplain or wetland effects along routes for heavy-haul trucks because these are existing roads and DOE assumed upgrades would be limited to those construction activities necessary to accommodate the heavy-haul vehicles. If DOE selected heavy-haul trucks to transport spent nuclear fuel and high-level radioactive waste to the Yucca Mountain site, it would also select one of five routes (Figure 6-20) and one of three alternative intermodal transfer station sites (Figure 6-21). DOE would then prepare a more detailed floodplain/wetlands assessment of the selected alternatives to determine to

what extent the routes and station locations might be subject to flooding and whether the upgrades would affect wetlands.

Heavy-Haul Truck and Intermodal Transfer Station Operations. Surface-water impacts during operations would be limited to those from maintaining and resurfacing highways and parking areas at a midroute stopover that the heavy-haul trucks would use. As discussed above, good construction practices overseen by the Nevada Department of Transportation would limit impacts that could result from spills of chemical contaminants in the course of highway maintenance and resurfacing activities. Contamination of surface water caused by contaminants leached from new asphalt would be similar to that which occurs in the periodic resurfacing of asphalt highways.

Operations at a completed intermodal transfer station would have little impact on surface waters beyond any permanent drainage alterations that occurred during construction. The station area runoff rates would differ from those of the natural or existing terrain but, given the relatively small size [0.2 square kilometer (50 acres)] of the potentially affected area, they would add little to overall runoff quantities for the area.

The general design criteria for a station would consider the potential for a 100-year flood. Because the spent nuclear fuel and high-level radioactive waste shipping casks would not be opened or otherwise disassembled, the use of industrial design standards for this facility would be appropriate. The analysis assumes that the station would have a diesel-powered generator to provide standby electric power and an associated diesel storage tank. The diesel tank would present a minor potential for spills and releases. Runoff retention areas would limit impacts of potential oil and diesel spills in parking areas.

6.3.3.1.4 *Common Route Groundwater Impacts*

Highway Construction and Upgrades. For highway upgrades, the most likely impacts would be changes to infiltration rates and new sources of contamination that could migrate to groundwater during construction. In this case, however, the potential for impacts would be small due to the relatively small areas affected by upgrading and the fact that highway construction [with the exception of 2 kilometers (1.2 miles) of new highway near Beatty, Nevada, and a midroute stopover], would be a modification of existing roadways. In addition, there would be no large sources of contamination.

Construction activities would disturb and loosen the ground, which could produce greater infiltration rates. However, this impact would be minor and short-lived as contractors completed their work and stabilized the disturbed areas.

Intermodal Transfer Station Construction. Construction activities for an intermodal transfer station would disturb and loosen the ground for some time, which could cause higher infiltration rates. However, this impact would be minor and short-lived as contractors completed the facility and stabilized the disturbed areas.

Water needs for construction would be met by trucking water to the site, installing a well (which would also be used for operations), or possibly by connection to a local water distribution system. In any case, water demand would be small for construction.

Heavy-Haul Truck and Intermodal Transfer Station Operations. The use of highways by heavy-haul trucks would have little impact on groundwater resources. There would be no continued need for water along the route, and there would be no changes to recharge beyond those at the completion of construction.

The operation of a completed midroute stopover and an intermodal transfer station would have little impact on groundwater. Infiltration rates would be as described above for the completion of construction;

the relatively small size of the facilities would minimize changes. Potential sources of contamination at the intermodal transfer station would consist primarily of a diesel fuel tank for the standby generator and heavy equipment. Water demand at the station and the midroute stopover would be small, consisting primarily of the needs of the operators, and would be obtained by the methods described above for construction. This demand would cause no noticeable change in water consumption rates for the area.

Other impacts to hydrology would differ among the implementing alternatives, as described in Section 6.3.3.2.

6.3.3.1.5 *Common Route Biological Resources and Soils Impacts*

Highway Construction and Upgrades. Highway upgrade activities would involve improving existing road surfaces and possibly building a bridge near Beatty, Nevada (Caliente route), a midroute stopover (Caliente routes), and about 2 kilometers (1.2 miles) of new highway to handle heavier vehicles (DIRS 155347-CRWMS M&O 1999, Request #048). Areas disturbed by these activities would be in, adjacent to, or near existing rights-of-way. These areas would consist of habitats previously degraded by human activities, which would limit impacts associated with the routes. Clearing of vegetation and soil disturbance would create habitat for colonization by exotic plant species that are present along the candidate routes. This could result in an increase in abundance of exotic species along the routes, which could result in suppression of native species and increased fuel loads for fire. Reclamation of disturbed areas would enhance the recovery of native vegetation and reduce colonization by exotic species. Slight alterations of habitat immediately adjacent to existing roads would have only small impacts on desert tortoises because work would occur in the existing right-of-way. Tortoise populations are depleted for more than a kilometer on either side of roads having average daily traffic greater than 180 vehicles (DIRS 103160-Bury and Germano 1994, pp. 57 to 72). Game species, wild horses and burros, and other animals could temporarily avoid habitat adjacent to roads during highway upgrades, but upgrades would not otherwise add to the effects of these roads on the movement patterns or behavior of these animals. The modification of bridges and culverts over perennial streams, if necessary, could temporarily disrupt stream flow and increase sedimentation in downstream aquatic environments. DOE anticipates that preconstruction surveys of potentially disturbed areas would identify and locate sensitive biological resources and best management practices would minimize the impacts of highway upgrades.

All of the heavy-haul truck implementing alternatives cross perennial or ephemeral streams that may be classified as jurisdictional waters of the Unites States. Discharge of dredged or fill material into those waters is regulated under Section 404 of the Clean Water Act. After the selection of a heavy-haul truck implementing alternative, if requested, DOE would assist the Nevada Department of Transportation to identify any jurisdictional waters of the United States that highway upgrades would affect; develop a plan to avoid when possible, and otherwise minimize, impacts to those waters; and obtain, as appropriate, an individual or regional permit from the U.S. Army Corps of Engineers for the discharge of dredged or fill material. By implementing the mitigation plan and complying with other permit requirements, the Nevada Department of Transportation would ensure that impacts to wetlands and other waters of the United States would be small.

The primary soil impacts from improvements to highways would be land disturbance. Road improvements would consist of widening existing roadways, constructing turnouts and truck lanes at designated stretches along the routes, and improving existing intersections. Water would be applied during construction to suppress dust and compact the soil; this would reduce the potential for erosion. Drainage control along the route probably would remain as it is now. These combined measures would minimize the potential for adverse impacts to soils.

Intermodal Transfer Station Construction. The biological settings of the three potential sites for an intermodal transfer station differ; Section 6.3.3.2 addresses impacts for each of the Nevada heavy-haul transportation implementing alternatives.

Soil impacts from the construction of an intermodal transfer station would arise primarily from the direct impacts of land disturbance and would apply to each station site and route. Chapter 3, Section 3.2.2.2.1, lists estimates of land area required for an intermodal transfer station. The disturbed areas probably would be subject to increased erosion for at least some of the construction phase. Water would be applied during construction to suppress dust and compact the soil; this would reduce the potential for erosion. At the beginning of station construction, the topsoil would be stripped and stockpiled; during construction, temporary erosion control systems would minimize erosion impacts. At the completion of construction, the topsoil would be replaced over areas not used for station facilities, the area disturbed surrounding the station would be revegetated, and other permanent erosion control systems would be installed as appropriate.

Heavy-Haul Truck and Intermodal Transfer Station Operations. Impacts to biological resources from operations along any of the five possible routes would be very small. Because existing roadways would not be greatly altered, operations and maintenance would not lead to additional habitat losses. Heavy-haul truck operations could kill individuals of some species, but losses would be unlikely to have a detectable impacts on the regional population of any species and would be small in comparison to losses caused due to other traffic on the highways. Passing trucks could disrupt wildlife, but such effects would be transitory. The use of an upgraded highway would have only a small impact on soils.

Impacts to biological resources from operations at an intermodal transfer station and a midroute stopover would be very small. Operations would not lead to additional habitat losses. Individuals of some species could be disturbed or killed by human activities at the station and stopover, but such losses would be unlikely to have a detectable impact on the regional population of any species.

The use of a completed intermodal transfer station and midroute stopover should have only small impacts on soils. The station and stopover would be maintained throughout the operations period, including the repair of erosion damage to the grounds around the station and the rail siding.

Other impacts to biological resources would differ among the heavy-haul truck implementing alternatives, as described in Section 6.3.3.2.

6.3.3.1.6 *Common Route Cultural Resources Impacts*

Highway Construction and Upgrades and Intermodal Transfer Station Construction. Impacts (such as disturbing sites or damaging artifacts) could occur, primarily from surface-disturbing activities, to archaeological, historic, and traditional Native American cultural sites from upgrading highways, constructing a midroute stopover, and building an intermodal transfer station. Cultural resource inventories by the Nevada Department of Transportation and others identify certain archaeological and historic sites in established rights-of-way [generally about 60 meters (200 feet) wide]. Section 6.3.3.2 discusses the impacts of individual routes.

Heavy-Haul Truck and Intermodal Transfer Station Operations. After the identification, evaluation, and mitigation of impacts to significant cultural sites prior to construction activities associated with the upgrading of highways or construction of an intermodal transfer station, there would be no additional impacts to these resources from the operation of a heavy-haul truck route.

Although existing highways would be used, American Indians have expressed concern about the transport of spent nuclear fuel and high-level radioactive waste through tribal lands and through the larger region

that comprises their traditional holy lands (DIRS 102043-AIWS 1998, all). Use of the Caliente/Las Vegas, Apex/Dry Lake, or Sloan/Jean route would include travel on U.S. 95 across a 1.6-kilometer (1-mile) section of the Las Vegas Paiute Indian Reservation. The Caliente/Las Vegas and Apex/Dry Lake routes pass near the Moapa Indian Reservation. The Caliente route along U.S. Highway 95 runs adjacent to the Scottys Junction trust lands parcel that Congress recently transferred to the Timbisha Shoshone tribe.

Other impacts to cultural resources would differ among the heavy-haul truck implementing alternatives, as described in Section 6.3.3.2.

6.3.3.1.7 *Common Route Occupational and Public Health and Safety Impacts*

Highway Construction and Upgrades. Traffic-related fatalities could occur among workers and members of the public during the upgrading of Nevada highways for heavy-haul truck use. The number of fatalities would depend on the amount of construction activity needed to upgrade a route. There would be no other common impacts for highway construction under any of the implementing alternatives. Section 6.3.3.2 describes impacts for each of the implementing alternatives. The construction of a midroute stopover for routes originating in Caliente would not add much to the impacts of highway construction discussed in Section 6.3.3.2.

Intermodal Transfer Station Construction. Impacts to workers from industrial hazards during the construction of an intermodal transfer station would be the same for all three possible locations. These impacts would be small (see Table 6-85). The analysis estimated impacts to workers in terms of total recordable cases of injury or illness, lost workday cases, and fatalities to workers. In addition, it estimated that there would be less than 1 (0.03) construction and construction workforce traffic-related fatality.

Table 6-85. Health impacts to workers from industrial hazards during construction of an intermodal transfer station.

Group	Total recordable cases[a]	Lost workday cases	Fatalities
Involved	3.8	1.8	0.01
Noninvolved[b]	0.3	0.1	0
Totals[c]	4.1	1.9	0.01

a. Total recordable cases includes injuries and illness.
b. Noninvolved worker impacts based on 25 percent of the involved worker level of effort.
c. Impacts are totals for 18 months.

Heavy-Haul Truck and Intermodal Transfer Station Operations. Section 6.3.3.2 discusses impacts for heavy-haul truck transportation and operations for each of the heavy-haul truck implementing alternatives. Common impacts for intermodal transfer station operations would include those to workers from industrial hazards and exposure to ionizing radiation (radiological impacts). DOE has determined that, because worker exposures to hazardous or toxic materials would be unlikely, workers at the station would incur no impacts from such materials. Table 6-86 lists potential impacts to workers from industrial hazards. In addition, there would be less than one (0.38) traffic-related fatality involving intermodal transfer station workers during operations.

Table 6-86. Health impacts to workers from industrial hazards during operation of an intermodal transfer station.

Group	Total recordable cases[a]	Lost workday cases	Fatalities
Involved	52	29	0.14
Noninvolved[b]	3.0	1.1	0.003
Totals[c]	55	30	0.15

a. Total recordable cases includes injuries and illness.
b. Noninvolved worker impacts based on 25 percent of the involved worker level of effort.
c. Totals for 24 years of operations.

Intermodal transfer station workers would be exposed to direct radiation from the shipping casks the station would handle. Involved worker exposures would occur during both the inbound (to the proposed repository) and outbound (to the commercial and DOE sites) portions of the

shipment campaign. The involved worker group would include as many as 20 personnel performing station operational tasks over a total shipment campaign of about 19,300 casks (9,650 inbound and 9,650 outbound).

The analysis assumed that noninvolved workers would not be exposed to direct radiation during intermodal transfer station operations. To assess potential radiological impacts at the intermodal transfer stations, the EIS analysis assumed that noninvolved workers would be persons involved with the day-to-day operations of the facility and would have no direct involvement with handling spent nuclear fuel and high-level radioactive waste.

Table 6-87 lists doses and radiological impacts to an individual worker and the involved worker population. The estimated doses are based on involved worker doses from DIRS 104791-DOE (1992, p. 4.2).

Table 6-87. Doses and radiological impacts to involved workers from intermodal transfer station operations.[a]

Group	Dose	Latent cancer fatality
Maximum individual worker	12 rem[b]	0.005[c]
Involved worker population	260 person-rem	0.11[d]

a. Totals for 24 years of operations.
b. Based on 500-millirem-per-year administrative dose limit.
c. The estimated probability of a latent cancer fatality in an exposed individual.
d. The estimated number of latent cancer fatalities in an exposed involved worker population.

Table 6-87 indicates that the involved group of workers could incur a collective dose of about 260 person-rem over the operating period of the intermodal transfer station. The analysis estimated that about 0.1 latent cancer fatality would occur in the exposed worker population. The maximum individual dose accumulated by these workers was assumed to be 500 millirem per year or 12 rem for a worker who worked at the facility for the 24-year operating period. This dose would result in a 0.005 probability of a latent cancer fatality (about a 1-in-200 chance). The assumed annual average dose to an involved worker is the administrative limit on occupational dose that DOE established for its facilities (DIRS 156764-DOE 1999, Article 211). Because vehicles would not be loaded or unloaded at a midroute stopover (Caliente routes), workers at the stopover would receive only small radiation doses.

Incident-Free Transportation. Incident-free impacts of heavy-haul truck transportation in Nevada to individual workers and the public would be unique for each of the five Nevada heavy-haul truck transportation implementing alternatives; these are discussed for each implementing alternative in Section 6.3.3.2. In addition, the incident-free impacts that would occur in Nevada from 1,079 legal-weight truck shipments, although common among the heavy-haul truck implementing alternatives, are reported along with the incident-free impacts for heavy-haul truck transportation in Section 6.3.3.2 for each heavy-haul truck implementing alternative.

Incident-free impacts to hypothetical maximally exposed individuals would be similar among the Nevada heavy-haul truck transportation implementing alternatives. Table 6-88 lists the impacts to maximally exposed individuals including a Nevada-specific individual exposed to heavy-haul truck shipments. Appendix J, Section J.1.3.2.2 describes assumptions for estimating doses to maximally exposed individuals along routes in Nevada.

Accidents. Accident risks and maximum reasonably foreseeable accidents for heavy-haul truck shipments of spent nuclear fuel and high-level radioactive waste would be similar among the Nevada heavy-haul truck transportation implementing alternatives, so this section discusses them.

Table 6-89 lists the accident risks from the transportation of spent nuclear fuel and high-level radioactive waste for the five Nevada heavy-haul truck transportation implementing alternatives. The data show that

Table 6-88. Estimated doses and radiological impacts to a maximally exposed individual for heavy-haul truck implementing alternatives.[a,b]

Individual	Dose (rem)	Probability of latent fatal cancer
Involved workers		
Crew member (rail, heavy-haul truck or legal-weight truck)	48[c]	0.02
Inspector	34	0.013
Railyard crew member	4.2	0.002
Public		
Resident along route (rail)	0.002	0.000001
Nevada resident along route (heavy-haul)[d]	0.53	0.00027
Person in traffic jam[e] (legal-weight truck)	0.02	0.000008
Person at service station[f] (legal-weight truck)	0.08	0.00004
Resident near rail stop[g]	0.002	0.000001

a. The assumed external dose rate is 10 millirem per hour at 2 meters (6.6 feet) from the vehicle for all shipments.
b. Totals for 24 years of operations.
c. Based on 2-rem-per-year administrative dose limit. If a lower dose limit, for example 500 millirem per year, was imposed for transportation workers or state inspectors, maximally exposed individual doses would be lower. See DIRS 156764-DOE (1999, Article 211) for DOE guidance on occupational dose limits.
d. This represents a Nevada resident approximately 15 meters (49 feet) from an intersection. This individual would be exposed for 1 minute per shipment plus 30 minutes per year due to traffic delays.
e. Person in a traffic jam is assumed to be exposed one time only.
f. Assumes the person works at the service station for all 24 years of operations. Mitigation would be required to reduce doses to members of the public to below 100 millirem per year.
g. This represents a Nevada resident approximately 30 meters (98 feet) from the branch rail line. See Section J.1.3.2.2.

Table 6-89. Health impacts[a] to the public from accidents for Nevada heavy-haul truck implementing alternatives.

Risk	Caliente	Caliente/Chalk Mountain	Caliente/Las Vegas	Apex/Dry Lake	Sloan/Jean
Radiological accident risk					
Dose risk (person-rem)	0.01	0.0019	0.056	0.056	0.12
LCF[b]	0.000005	0.000001	0.0000009	0.000028	0.00006
Traffic fatalities	0.6	0.33	0.43	0.23	0.25

a. Impacts are reported for 24 years of operations.
b. LCF = latent cancer fatality.

the risks, which are for 24 years of operations, are low for all five alternatives. These risks include those associated with transporting 1,079 legal-weight truck shipments from the commercial sites that would not have the capability to load rail casks while operational. Small variations in the risk values, principally evident for a Sloan/Jean route, are in part a result of the risks associated with transporting rail casks arriving from the east on the Union Pacific Railroad's mainline through the Las Vegas metropolitan area to a Sloan/Jean intermodal transfer station. The values that would apply for a Caliente/Chalk Mountain or Apex/Dry Lake route are lower because of a shorter route (Apex/Dry Lake), or a more remote and mid-length route (Caliente/Chalk Mountain).

Consequences of Maximum Reasonably Foreseeable Accident Scenarios. DOE evaluated the impacts of maximum reasonably foreseeable accident scenarios for national transportation (see Section 6.2). The results for the national transportation mostly rail scenario apply to transportation in Nevada.

6.3.3.1.8 *Common Route Socioeconomic Impacts*

DOE analyzed five Nevada heavy-haul truck transportation implementing alternatives for potential socioeconomic impacts from expenditures to upgrade and maintain Nevada highways, operate heavy-haul trucks, and construct and operate an intermodal transfer station.

Highway Construction and Upgrades. The dynamics of specific construction projects include a period of brief, intense elevation in project-related employment, followed by an abrupt decrease in associated employment opportunities as construction workers move on to other projects. Project dynamics can also include population increases followed by net declines in population as related employment requirements diminish. In general, increases in population lag behind increases in employment. For the most part, the projected impacts of highway upgrade work would occur in Clark County, which the analysis assumed would be the home county for construction workers because of its large workforce. Section 6.3.3.2 discusses the analysis of impacts to counties along each of the five candidate routes. The time and employment required to complete road upgrades would depend on the route.

Intermodal Transfer Station Construction. If a decision was made to construct an intermodal transfer station, DOE anticipates that preliminary architecture and engineering work would begin in 2007, followed by the start of construction at the selected site in 2008. Construction would last about 18 months. For this analysis, DOE assumed that construction workers would probably come from Clark County.

Although there would be small differences among the three candidate locations for an intermodal transfer station, the total statewide increase in employment (direct and indirect) that would result from the project would peak in 2008 and would be about 135 workers. Population increases resulting from a net influx of new workers would peak in 2009 with about 65 additional residents. These employment and population increases, which would occur mostly in Clark County, would be small and temporary for the affected counties.

Increases in real disposable income from constructing an intermodal transfer station would peak in 2008 at between about $3.6 million and $4.1 million. The increase in Gross Regional Product would also peak in 2008 at between $10.8 million and $11.4 million. State and local government expenditures would peak in 2009 between $198,000 and $243,000. These increases to real disposable income, Gross Regional Product, and government expenditures from construction would be short-term and less than 0.5 percent of the baselines in the affected counties. (All dollar values reported in this section are in 2001 dollars unless otherwise stated.)

Highway Maintenance for Heavy-Haul Truck Operations. If DOE decided to use heavy-haul trucks, annual maintenance would be required after the completion of the highway upgrades. In addition, DOE assumed the routes would be resurfaced approximately every 8 years. Thus, highway expenditures for resurfacing a selected route would occur in approximately 2016, 2024, and 2032. The employment required for road maintenance would depend on the selected route. Section 6.3.3.2 discusses route-specific impacts for each of the five candidate routes.

Heavy-Haul Truck and Intermodal Transfer Station Operations. The socioeconomic impacts of operating heavy-haul trucks and an intermodal transfer station largely would occur in the county in which the station was located. Section 6.3.3.2 discusses these impacts for each of the five candidate routes.

6.3.3.1.9 *Common Route Noise and Vibration Impacts*

Highway Construction and Upgrades and Intermodal Transfer Station Construction. Impacts would occur from construction noise associated with upgrading road surfaces, constructing a midroute

stopover, and constructing an intermodal transfer station. The upgrades and construction would include the use of earth-moving equipment (bulldozers, graders, loaders, dump trucks) and asphalt-laying equipment. Earthmoving equipment would dominate maximum noise levels from construction and would achieve levels of 70 to 80 dBA at 15 meters (50 feet) from the source. The potential for noise impacts from construction would depend on the presence of humans along the routes and near the intermodal transfer station location. These persons would live in communities and possibly individual residences. Noise impacts from road upgrades and general construction would be transient, move with the construction, and end when the construction ended. The impacts, therefore, would be temporary for any location along affected highways. Construction noise, which would not occur at night, would be equivalent to the daytime standard (60 dBA) at distances of about 2,000 meters (6,600 feet). Construction upgrades of heavy-haul truck routes and construction of branch rail lines would be unlikely to cause vibration damage to historic buildings because of the distance of potentially sensitive buildings from construction sites.

The American Indian Writers Subgroup (DIRS 102043-AIWS 1998, p. 2-19) has identified noise generated along transportation routes as a concern because it could affect ceremonies and the solitude necessary for healing and praying. Areas or sites of interest to Native Americans have not been identified along these routes.

Heavy-Haul Truck and Intermodal Transfer Station Operations. Heavy-haul trucks would be double-tractor vehicles that this analysis assumed would travel at speeds of 32 to 80 kilometers (20 to 50 miles) an hour. Noise levels probably would be greatest when loaded heavy-haul trucks were moving up grades at speeds as slow as 8 kilometers (5 miles) an hour. This would occur as the trucks approached the proposed repository site and on portions of the Caliente route (see Chapter 2, Section 2.1.3.3). At 48 kilometers (30 miles) an hour, the estimated noise from a single heavy-haul truck moving up a 5-percent grade would be 45 dBA at a distance of 630 meters (about 2,100 feet) from the road with no background traffic. Elevated truck noise would not be a consideration on the Nevada Test Site, the Nellis Air Force Range, or the repository site. Transportation workers would use hearing protection as required by Occupational Safety and Health Administration regulations.

To assess the impact noise generated by heavy-haul trucks, DOE based the estimated increase in the 1-hour average sound level on traffic volumes along the routes for heavy-haul trucks (DIRS 156930-NDOT 2001, all). Noise estimates were based on a total of three double-tractor vehicles passing through a community or past a given point on a highway within 1 hour (DIRS 155778-Melnick 1998, all). The estimated increase in the 1-hour average sound level would not be perceptible in areas with high traffic volume and would be as high as 0.3 to 4.7 dBA in areas of low traffic volume. The estimated noise levels in this analysis were dominated by commercial tractor-trailers (20 percent of total traffic volume) on the open highway and in smaller communities.

During operations, DOE would transport 11 shipments a week of spent nuclear fuel and high-level radioactive waste to the proposed repository and 11 empty casks from the repository. Because the heavy-haul trucks probably would travel individually, elevated noise would occur during the brief time when a vehicle passed through communities. There would be no nighttime noise because trucks of this size would be restricted to operating during daylight hours. Truck noise at a midroute stopover would be similar to noise along the adjacent route. Therefore, the potential for adverse noise impacts from heavy-haul trucks would be low.

Noise associated with operations at an intermodal transfer station would occur as it received shipments and transferred them from railcars to heavy-haul trucks for transport to the proposed repository site. However, the baseline noise level is already elevated because of existing rail line operations at the potential station locations. Additional sources of noise at a station would include transferring railcars from trains into the station, moving the railcars in the station, and receiving returning empty

transportation casks. Railcars could come to the station at night, so there would be a potential for nighttime sources of noise. However, shipments in the station could be handled during daylight hours, minimizing the potential for noise impacts.

Ground vibration resulting from the operation of heavy-haul trucks or trains would be unlikely to produce vibration levels of a magnitude sufficient to cause building damage. Heavy-haul trucks can create potentially damaging vibration if the vehicle hits a bump or pothole in the road. The magnitude of vibration produced depends on the speed of the vehicle and the size of the bump. Most of the energy of impact is absorbed by the inflated tires; as a consequence, ground vibration would not be a major impact for these operations. Heavy-haul trucks would operate at reduced speeds when operated at intermodal transfer stations. There are no known historic buildings or ruins of cultural significance that ground vibration could affect near intermodal transfer stations.

Other noise impacts would differ among the implementing alternatives, as described in Section 6.3.3.2.

6.3.3.1.10 *Common Route Aesthetics Impacts*

Highway Construction and Upgrades and Intermodal Transfer Station Construction. There could be impacts on visual resources during these activities because of the presence of workers, camps, vehicles, large earth-moving equipment, laydown yards, large cranes, and dust generation. However, this phase would be of limited duration (approximately 18 months for an intermodal transfer station and as long as 46 months for highway improvements). An intermodal transfer station would be in an already developed area, either for industrial or commercial use or adjacent to existing roads or rail corridors. Therefore, the facility would not change the character of land use in its vicinity. Dust generation during construction would be controlled by implementing best management practices such as misting or spraying disturbed areas. Construction activities would conform with the Bureau of Land Management Visual Resources Management guidelines (DIRS 101505-BLM 1986, all). If a route crosses Class II lands, more stringent management requirements would be necessary to retain the existing character of the landscape. However, the short duration of highway modification or construction activities, combined with the use of best management practices, would mitigate the impacts of activities, which could exceed the management requirements on any Class II lands.

Heavy-Haul Truck and Intermodal Transfer Station Operations. As many as 22 shipments would leave or arrive at the intermodal transfer station each week. Visual impacts would result from the presence of the station, increased worker activity in the area, the arrival and departure of trains, loading and unloading operations, and the arrival and departure of heavy-haul trucks. Noise and lighting impacts would occur at an intermodal transfer station but, due to the remote locations, there would be no significant impacts. Impacts would not exceed Bureau of Land Management Visual Resource Management Class III objectives, which require only the partial retention of the existing character of the landscape.

Other aesthetic impacts would differ among the implementing alternatives, as described in Section 6.3.3.2.

6.3.3.1.11 *Common Route Utilities, Energy, and Materials Impacts*

Highway Construction and Upgrades. The amounts of utilities, energy, and materials needed would depend on the amount of upgrading to be done, which would be specific to each route. The amount of utilities, energy, and materials for each route is given in the following sections. All of the required amounts are much less than current use rates in Nevada. For example, fossil-fuel consumption in Nevada was about 3.8 billion liters (1 billion gallons) in 1996 and none of the routes would require more than 0.5 percent of the annual consumption (DIRS 148094-BTS 1997, all).

Intermodal Transfer Station Construction. Intermodal transfer station design would be the same for any of the three sites and would include a small railyard with several sidings, a 180-metric-ton (200-ton) bridge crane, two steel prefabricated buildings (one for administration and one for maintenance), and a large paved area for heavy-haul truck parking and maneuvering. The basic facility would be a light industrial site with moderate utility requirements. During construction the electrical requirements would be supplied by portable generating equipment. Table 6-90 lists the materials that would be consumed during construction. The quantities of concrete, asphalt, and steel listed in the table are not substantial in comparison to annual use rates and would not affect the regional supply system. For example, the concrete required for an intermodal transfer station would be less than 1 percent of the concrete used in Nevada in 1998 (DIRS 104926-Bauhaus 1998, all). Similarly, the demand for electricity and fossil fuel during construction would not be great. The construction of a midroute stopover for heavy-haul trucks (routes originating in Caliente) is accounted for in the specific route data included in the following sections.

Table 6-90. Construction utilities, energy, and materials for an intermodal transfer station.

Electrical demand (kilowatts)	Fossil fuel (liters)[a]	Concrete (thousand metric tons)[b]	Asphalt (thousand metric tons)	Steel (thousand metric tons)
Onsite generation	Small	7.9	16	1.4

a. To convert liters to gallons, multiply by 0.26418.
b. To convert metric tons to tons, multiply by 1.1023.

Highway Maintenance for Heavy-Haul Truck Operations. Highways used by heavy-haul trucks would be maintained annually and resurfaced, on average, every 8 years. The amounts of utilities, energy, and materials for the annual and 8-year maintenance activities would be less than the initial amounts for upgrading the highways.

Heavy-Haul Truck and Intermodal Transfer Station Operations. The current estimate of electrical demand during the operation of an intermodal transfer station would be 165 kilowatts (DIRS 155347-CRWMS M&O 1999, Request #38). This would include 30 kilowatts for lighting, 50 kilowatts for each of the two buildings, 5 kilowatts for the guard station, and 30 kilowatts for the crane. The actual rate would be substantially less than peak capacity because operations would be intermittent. Only small amounts of fossil fuel would be used at an intermodal transfer station. Chapter 10 discusses fossil-fuel use for heavy-haul truck operations.

Other impacts on utilities, energy, and materials would differ among the implementing alternatives, as described in Section 6.3.3.2.

6.3.3.1.12 *Common Route Waste Management Impacts*

Highway Construction and Upgrades. Highway construction results in minimal waste. Excavated soil is used for fill elsewhere along the route and asphalt is recycled (DIRS 152538-Hoganson 2000, all; DIRS 152535-Hoganson 2000, all). Upgrading highways, including constructing a midroute stopover with a security trailer, could generate waste such as vegetation from land clearing (DIRS 152538-Hoganson 2000, all), construction debris from the trailer setup, and waste from onsite equipment maintenance (DIRS 152537-Hoganson 2000, all) that an independent contractor would dispose of in permitted landfills, or would recycle in the case of lubricants. In addition, construction materials for upgrading engineered structures such as bridges and culverts would be in correct sizes and numbers to minimize waste. Residual materials would be saved for reuse. A commercial vendor would provide portable restroom facilities and would manage the sanitary sewage. Waste would be handled in accordance with applicable environmental, occupational safety, and public health and safety requirements to minimize the possibility of adverse impacts to vegetation, wildlife, soils, surface and groundwater, and air quality from construction inside or outside of the region of influence.

Intermodal Transfer Station Construction. The administration building would be a prefabricated building and the maintenance building would be built on the site. Construction of the maintenance building would require traditional materials such as steel, lumber, and concrete that would result in debris requiring disposal or recycling. Excess construction materials would be salvaged. A maximum of 23 metric tons (26 tons) of construction debris would be disposed of in a local construction debris landfill. Approximately 750,000 metric tons (820,000 tons) of construction debris was disposed of in Nevada in 2000 (DIRS 155565-NDEP 2001, Section 2.1), so the maintenance building construction would add less than 0.01 percent. In addition, construction could require paints and resins that could become hazardous if discarded. Hazardous waste would be shipped to a permitted treatment and disposal facility. A commercial vendor would provide portable restroom facilities as necessary and manage the resulting sanitary sewage. Waste quantities from construction would be about the same for all sites. Impacts to treatment and disposal capacity from disposing of the construction debris, hazardous waste, and sanitary sewage would be small and consistent for all station locations.

Highway Maintenance for Heavy-Haul Truck Operations. Periodic maintenance of highways and resurfacing every 8 years would be unlikely to generate wastes, and asphalt would be recycled (DIRS 152535-Hoganson 2000, all). Environmental impacts from waste would be unlikely.

Heavy-Haul Truck Operations. Heavy-haul truck operations along any of the four routes would result in similar wastes from vehicle maintenance. Maintenance wastes are included in the intermodal transfer station operation discussion below.

The operation of a midroute stopover would generate sanitary solid waste and sanitary sewage at the security trailer. The waste would be proportional to the number of persons using the facility, about 5 kilograms (11 pounds) per day per person of solid waste (DIRS 155567-NDEP 2001, p. 5) and about 57 liters (15 gallons) of wastewater per day per person (DIRS 152492-Gibson 1974, p. 55) if potable water is supplied or less if chemical toilets are used. DOE would dispose of the sanitary solid waste in a permitted municipal landfill; the sanitary sewage would be trucked to a municipal sewage facility. The small quantities of solid and sanitary wastes would have a very small impact on treatment and disposal capacity. Management and disposition of the wastes from operations would comply with applicable environmental and occupational and public safety regulations to minimize the possibility of adverse impacts to vegetation, wildlife, air quality, soils, and water resources.

Intermodal Transfer Station Operations. Operations, regardless of the location, would generate (1) sanitary solid waste such as waste paper from office and personnel activities, (2) waste from maintenance activities, and (3) potentially a small amount [0.71 cubic meter (25 cubic feet) per month] of low-level radioactive waste such as the smear wipes from radiological surveys of shipping casks and vehicles (DIRS 104849-CRWMS M&O 1997, p. 10). The routine maintenance and minor repair of the estimated 20 tractor-trailers assigned to an intermodal transfer station would generate waste and recyclable materials. Lubricants, lead-acid batteries, tires, fuel, antifreeze, refrigerant, and miscellaneous used parts would be generated (DIRS 152534-Hoganson 2000, all). The majority of these wastes could be recycled, as is the case at another DOE fleet operation facility (DIRS 152532-Hoganson 2000, all). Estimated annual recyclable material would be 5.5 metric tons (6.0 tons), primarily lubricating oil. Waste requiring disposal would consist of 1,400 kilograms (3,000 pounds) of nonrecyclable tires per year and 23 kilograms (50 pounds) of drained oil filters per year (DIRS 152534-Hoganson 2000, all). About 83,000 metric tons (91,000 tons) of this type of waste was disposed of in Nevada in 2000 (DIRS 155565-NDEP 2001, Section 2.1), so the truck maintenance waste would add less than 0.01 percent. In addition, the intermodal transfer station would generate sanitary sewage that would be disposed of in an onsite septic system or through connection to a municipal sewage facility.

The intermodal transfer station operator would dispose of nonhazardous solid waste in a local permitted landfill with available capacity. Hazardous waste such as nonrecyclable lead-acid batteries and low-level

radioactive waste, if any, would be shipped to treatment and disposal facilities with appropriate permits. The small quantities would have very little impact on the treatment and disposal facilities. Treatment and disposal capacity for hazardous waste would be above the expected demand until 2013 (DIRS 103245-EPA 1996, pp. 32, 33, 36, 46, 47, and 50). Disposal capacity for a broad range of low-level radioactive wastes would be available at two currently licensed facilities (DIRS 152583-NRC 2000, section on U.S. Low-level Radioactive Waste Disposal).

There would be no unique environmental impacts of waste management for any of the heavy-haul truck implementing alternatives. Waste would be managed in accordance with applicable environmental, occupational safety, and public health and safety requirements to minimize the possibility of adverse impacts to vegetation, wildlife, air quality, soils, and water resources. Impacts to the capacity of treatment and disposal facilities receiving wastes generated during Nevada transportation would be small due to the small quantities of waste expected.

6.3.3.2 Impacts Specific to Individual Nevada Heavy-Haul Truck Implementing Alternatives

6.3.3.2.1 *Caliente Route Implementing Alternative*

The Caliente route (Figure 6-22) is approximately 533 kilometers (331 miles) long. Heavy-haul trucks and escorts leaving an intermodal transfer station in the Caliente area would travel directly from the intermodal transfer station to U.S. Highway 93. The trucks would travel west on U.S. 93 to State Route 375, then on State Route 375 to the intersection with U.S. 6. The trucks would travel on U.S. 6 to the intersection with U.S. 95 in Tonopah. The trucks would travel into Beatty on U.S. 95 where a short alternative truck route would be built on the west side of town because an existing intersection is too constricted to allow a heavy-haul truck to turn. Heavy-haul vehicles would then travel south on U.S. 95 to Lathrop Wells Road at Amargosa Valley, which would access the Yucca Mountain site.

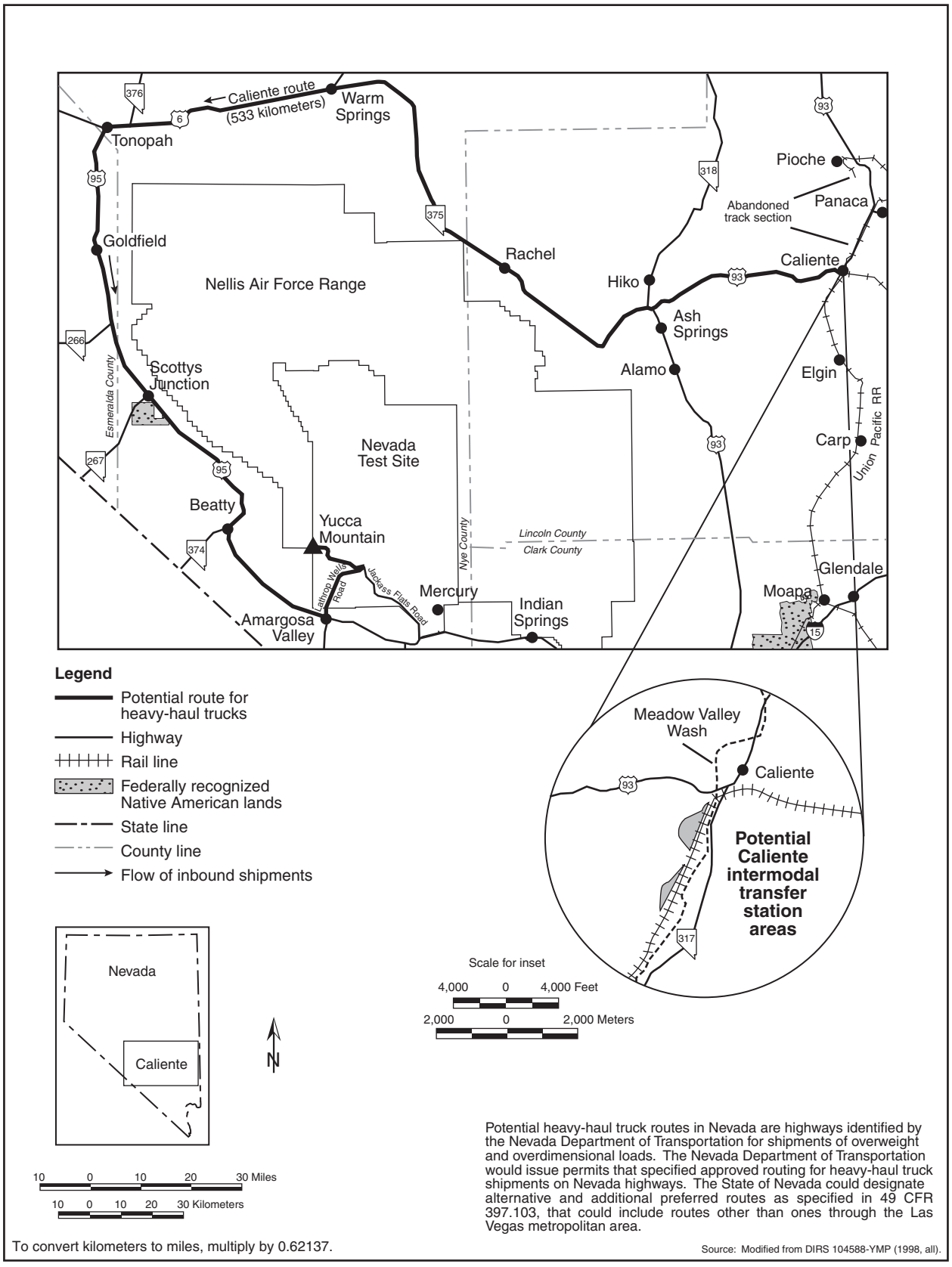
DOE would construct a parking area along a Caliente route to enable heavy-haul vehicles to park overnight. This parking area could be needed because the travel time (vehicle in motion plus periodic short stops for inspections) associated with a Caliente route would be as much as 16 hours and because DOE anticipates that the State of Nevada would issue special travel permits for the trucks that would include time-of-day and day-of-the-week travel restrictions that could preclude completing a trip in 1 day. This parking area would probably be near U.S. 6 between Warm Springs and Tonopah.

The potential siting areas for an intermodal transfer station are south of the City of Caliente in the Meadow Valley Wash area. DOE has identified two areas along the west side of the canyon, with a combined area of 0.74 square kilometer (180 acres). Areas along the east side of the canyon would not be used to avoid disrupting Meadow Valley Wash and because of poor access to the Union Pacific rail line. The estimated life-cycle cost to construct and operate an intermodal transfer station and to operate heavy-haul trucks along the Caliente route would be about $669 million in 2001 dollars.

The following sections address impacts that would occur to land use; biological resources and soils; cultural resources; hydrology including surface water and groundwater; occupational and public health and safety; socioeconomics; noise and vibration; aesthetics; and utilities, energy, and materials. Impacts that would occur to air quality and waste management would be the same as those discussed in Section 6.3.3.1 and are, therefore, not repeated here. Section 6.3.4 discusses the potential for transportation activities to cause environmental justice concerns in Nevada.

6.3.3.2.1.1 Caliente Route Land Use and Ownership

This section describes land-use impacts that could occur from the construction and operation of a Caliente intermodal transfer station and upgrade of highways and heavy-haul truck operation over the



Potential heavy-haul truck routes in Nevada are highways identified by the Nevada Department of Transportation for shipments of overweight and overdimensional loads. The Nevada Department of Transportation would issue permits that specified approved routing for heavy-haul truck shipments on Nevada highways. The State of Nevada could designate alternative and additional preferred routes as specified in 49 CFR 397.103, that could include routes other than ones through the Las Vegas metropolitan area.

To convert kilometers to miles, multiply by 0.62137.

Source: Modified from DIRS 104588-YMP (1998, all).

Figure 6-22. Caliente heavy-haul truck route.

Caliente route. Chapter 3, Section 3.2.2.2.1, describes the Caliente intermodal transfer station site and associated route.

With the exception of a small portion of the most northern part of the site area for an intermodal transfer station, the area is on patented land owned by the City of Caliente. The remaining part of the northern site is administered by the Bureau of Land Management. The northern site also includes an existing wastewater treatment plant (DIRS 104993-CRWMS M&O 1999, p. 21). A transfer of property from the Bureau, the City of Caliente, or other entities to DOE would be required.

Highway Construction and Upgrades. Land-use impacts that would be common to all locations are discussed in Section 6.3.3.1. The Caliente intermodal transfer station, located near the entrance to Kershaw-Ryan State Park, would be built on lands currently used for industrial or commercial purposes. Because of this, there should be no additional impacts to land use. Park visitors would receive short-term visual impacts from construction activities. In addition, park visitors could be affected by noise from construction activities that could lessen their recreational experience. These short-term impacts would exist only during construction.

In addition to the impacts on land use discussed in Section 6.3.3.1 for upgrading Nevada highways, approximately 3.4 square kilometers (834 acres) of land would be disturbed by the road upgrades and additional construction activities required for this route. Table 6-91 summarizes these disturbances. Approximately 0.04 square kilometer (10 acres) of land near Beatty, Nevada, would be acquired to construct approximately 2 kilometers (1.2 miles) of new highway. This section of highway would be needed to avoid conflicts between the requirement of wide turning areas for heavy-haul trucks and existing land uses in Beatty where U.S. 95 makes a 90-degree turn. In addition, approximately 0.04 square kilometer (10 acres) of land in the vicinity of Tonopah would be acquired for a midroute stopping area for heavy-haul trucks. This additional land requirement could require the purchase by or transfer of land to DOE.

Table 6-91. Land disturbances along the Caliente heavy-haul truck route.

Disturbance	Area disturbed[a] (square kilometers)[b]
Haul road disturbed area	1.9
Aggregate plants	0.3
Road widening	0.7
Passing lanes	0.2
Truck turnouts	0.08
Beatty truck alternate	0.04
Fortymile Wash new road	0.04
Overnight stops	0.04
Total disturbed area	3.4

. Numbers approximate due to rounding.
. To convert square kilometers to acres, multiply by 247.1.

Operations. There would be no direct land-use impacts associated with the operation of the Caliente intermodal transfer station or the Caliente route for heavy-haul trucks other than those described in Section 6.3.3.1.

6.3.3.2.1.2 Caliente Route Hydrology

DOE anticipates that limited impacts to surface water and groundwater would occur in the course of improving Nevada highways so they could accommodate daily use by heavy-haul trucks. This section discusses these potential impacts as well as those from the construction and operation of an intermodal transfer station and heavy-haul truck operations over the Caliente route. Section 6.3.3.1 discusses the hydrology impacts that would be common to all of the heavy-haul truck implementing alternatives. This section focuses on the hydrology impacts that are unique to the Caliente route.

Surface Water

Section 6.3.3.1 discusses impacts to surface water from the construction and operation of an intermodal transfer station and upgrades to highways. The common impacts discussed apply to surface water along the Caliente route.

Appendix L contains a comparison of what is known about the floodplains, springs, and riparian areas at the three candidate intermodal transfer station sites (see Sections L.3.2.6 and L.4.2.2). As noted in Section L.3.2.6, the two locations being considered for the Caliente intermodal transfer station are outside the 100-year flood zone of Meadow Valley Wash, but inside the 500-year flood zone.

Groundwater

Highway Construction and Upgrades. Section 6.3.3.1 discusses the impacts to groundwater from the construction of an intermodal transfer station. Groundwater impacts from upgrading highways would be limited to those caused by the use of water from construction wells. The upgrades to the Caliente route would require about 126,000 cubic meters (100 acre-feet) (DIRS 104917-LeFever 1998, all) of water which, for planning purposes, was assumed to come from 16 wells.

The average amount of water withdrawn from each well would be about 7,900 cubic meters (6 acre-feet). Chapter 3, Section 3.2.2.2.3, identifies the hydrographic areas over which the Caliente route would pass, their perennial yields, and whether the State considers each a Designated Groundwater Basin. Table 6-92 summarizes the status of the hydrographic areas associated with the Caliente route. It also identifies the approximate portion of the route that would pass over Designated Groundwater Basins.

Table 6-92. Hydrographic areas along Caliente route.

	Designated Groundwater Basins	
Hydrographic areas	Number	Percent of corridor length
19	8	40

The withdrawal of 7,900 cubic meters (6 acre-feet) a year from a well would have little impact on the hydrographic areas associated with the Caliente route based on their perennial yields (Chapter 3, Section 3.2.2.2.3), even if multiple wells were placed in the same hydrographic area. As indicated in Table 6-92, about 40 percent of the route's length would be in areas with Designated Groundwater Basins, where the Nevada State Engineer's office carefully watches the potential for groundwater depletion. This does not mean that a contractor could not obtain water appropriations in these areas; the State Engineer would have the authority to approve such appropriations. Requests for water appropriations under this action would be for minor amounts and for a short-term construction action, which should provide the State Engineer even more discretion. Other options would be to lease temporary water rights from individuals along the route, ship water from other permitted resources by truck to construction sites (about 7,000 truckloads), or use a combination of these two actions. Obtaining a water appropriation from the State Engineer for short-term construction use or using an approved allocation would ensure that groundwater resources would not be adversely affected.

Operations. Section 6.3.3.1 discusses the impacts to groundwater from the operation of an intermodal transfer station, highway maintenance, and heavy-haul truck operations.

6.3.3.2.1.3 Caliente Route Biological Resources

Section 6.3.3.1 discusses the impacts to biological resources from the construction and operation of an intermodal transfer station and upgrades to highways that would be common to all candidate sites for an intermodal transfer station and associated routes. This section discusses the construction- and operations-related impacts that would be unique to the Caliente intermodal station and route.

Highway Construction and Upgrades. Potential Caliente intermodal transfer station siting locations include two areas along the west side of the Meadow Valley Wash canyon. The land cover types are agriculture and salt desert scrub (DIRS 104593-CRWMS M&O 1999, pp. 3-30 and D-1). The construction site would disturb approximately 0.2 square kilometer (50 acres). No special status species occur in the proposed location of the Caliente intermodal transfer station. However, two species classified as sensitive by the Bureau of Land Management—the Meadow Valley Wash speckled dace and

the Meadow Valley Wash desert sucker—occur in the adjacent Meadow Valley Wash (DIRS 104593-CRWMS M&O 1999, p. K-1). The construction of an intermodal transfer station could affect these fish by increasing the sediment load in the wash during construction. This construction would not affect southwestern willow flycatchers or their habitat in Meadow Valley Wash (DIRS 152511-Brocoum 2000, pp. A-9 to A-13). There is no designated game habitat at the proposed location for the intermodal transfer station, but the adjacent Meadow Valley Wash is classified as important habitat for water fowl and Gambel's quail (DIRS 104593-CRWMS M&O 1999, p. 3-30). Impacts to this habitat would be small.

Moist areas in the proposed location and the adjacent perennial stream and riparian habitat along Meadow Valley Wash could be classified as jurisdictional wetlands or other waters of the United States, although no formal wetlands delineation of the area has been conducted. If this site was selected, DOE would delineate the boundaries of any jurisdictional wetlands, develop a plan to mitigate impacts, and consult with the U.S. Army Corps of Engineers regarding the need to obtain a regional or individual permit under Section 404 of the Clean Water Act.

The predominant land cover types along the Caliente route are salt desert scrub, sagebrush, and creosote-bursage (DIRS 104593-CRWMS M&O 1999, p. 3-30). The regional area for each vegetation type is extensive (DIRS 104593-CRWMS M&O 1999, pp. C1 to C5). Because areas disturbed by upgrade activities would be in or adjacent to the existing rights-of-way, and have been previously degraded by human activities, impacts would be small. In addition, vegetation would be removed from approximately 0.04 square kilometer (10 acres) of undisturbed land for development of a midroute stopover. This area would be east of the City of Tonopah. The precise location is not known at this time, so the land cover type that would be disturbed cannot be identified. However, as noted above, all land cover types along the route are extensive and often degraded in the region, so loss of this area would be unlikely to cause adverse effects to the population of any plant or animal species.

Three threatened or endangered species occur along the Caliente route (DIRS 104593-CRWMS M&O 1999, p. 3-30). The desert tortoise occurs along the southern part of the route along U.S. 95 from Beatty to Yucca Mountain. Construction activities could kill or injure some tortoises; however, their abundance is low in this area (DIRS 103281-Karl 1981, pp. 76 to 92; DIRS 101914-Rautenstrauch and O'Farrell 1998, pp. 407 to 411), so losses would be small. One endangered species—the Hiko White River springfish—occurs in Crystal Springs (50 CFR 17.95). The outflow of the spring comes within about 10 meters (33 feet) of State Route 375 near its intersection with State Route 318 near U.S. 93 (DIRS 104593-CRWMS M&O 1999, p. 3-30). Therefore, any upgrading of the road in this area could have the potential to affect critical habitat. DOE would ensure that construction activities avoided the spring outflow channel and would implement mitigation measures to ensure that no sediment entered the stream. In addition, formal consultation with the U.S. Fish and Wildlife Service would be initiated if this heavy-haul truck route was selected, and DOE would implement all terms and conditions required by the Service.

An introduced population of the threatened Railroad Valley springfish occurs in Warm Springs (DIRS 103261-FWS 1996, p. 20), the outflow of which crosses U.S. 6. If improvements to the highway in the vicinity of the Warm Springs outflow were necessary, there could be temporary adverse impacts to this introduced population due to habitat disturbance and siltation if not properly mitigated. Six other special status species occur along this route (DIRS 104593-CRWMS M&O 1999, pp. 3-30 and 3-31) but, because construction activities would be limited to the road and adjacent areas and care would be taken to ensure no sediments entered the streams, species should not be affected.

This route would cross eight areas designated as game habitat (DIRS 104593-CRWMS M&O 1999, p. 3-31). The amount of habitat in these areas would be reduced slightly due to construction activities alongside existing roads. Game animals in these areas during construction could be disturbed.

Nineteen springs occur near this route (DIRS 104593-CRWMS M&O 1999, p. 3-31). Areas around these springs may be jurisdictional wetlands or waters of the United States. However, no formal delineation has been made. Construction could increase sedimentation in these areas. The corridor crosses a number of ephemeral streams that may be classified as waters of the United States. DOE would work with the State of Nevada and the U.S. Army Corps of Engineers to minimize impacts to these areas, and would obtain individual or regional permits, as appropriate.

Impacts on soils would be transitory and small and would occur only along the shoulders of existing roads.

Operations. Impacts from operations would include periodic disturbances of wildlife from activities at the intermodal transfer station and additional truck traffic along the route. Trucks probably would kill individuals of some species but losses would be few and unlikely to affect regional populations of any species. No additional habitat loss would occur during operations. Impacts to soils would be small.

6.3.3.2.1.4 Caliente Route Cultural Resources

Highway Construction and Upgrades. Previous surveys have recorded a total of 178 archaeological sites within the existing rights-of-ways of the highways that make up this alternative. Upgrade of highways associated with the Caliente heavy-haul truck route would affect (by disturbing the sites or crushing artifacts) two known archaeological sites in the existing highway right-of-way [about 60 meters (200 feet)] that have been evaluated as potentially significant (DIRS 155826-Nickens and Hartwell 2001, p. 12). In addition, another 20 archaeological sites occur in areas in the existing right-of-way that would experience upgrade activities. These sites have been recorded but not evaluated, and include one historic grave along the highway south of Tonopah. This route passes through the southern area of the Tonopah Multiple Resource Area historic mining district and the Goldfield Historic District, both of which are listed on the *National Register of Historic Places*. At Tonopah, the historic district lies north of the junction of U.S. Highways 6 and 95, and heavy-haul truck traffic would not affect the historic components of this district. Although U.S. 95 passes through the heart of the historic district at Goldfield, which includes commercial and private residence buildings in the downtown area, adverse effects from heavy-haul traffic would be unlikely. Two listed historic properties are located in downtown Caliente, near the highways leading from the Caliente intermodal transfer station site. Both of these, the State-listed Smith Hotel and the National Register-listed Union Pacific Depot, are far enough from the highway route that potential impacts are unlikely.

Preliminary studies have identified several areas important to Native Americans along the Caliente heavy-haul truck route that would require additional field ethnographic studies (DIRS 155826-Nickens and Hartwell 2001, Table 8). These include Oak Springs Summit and Six-Mile Flat/Pahroc Summit along U.S. 93 west of Caliente; Crystal Springs, at the junction of U.S. 93 and State Route 375; Twin Springs, Twin Springs slough, and Echo Lakes area, along State Route 375 between Rachel and Warm Springs; and the Warm Springs/Hot Creek Valley area, at the junction of State Route 375 and U.S. 6.

Archaeological surveys at the candidate Caliente intermodal transfer station site just south of the City of Caliente recorded four sites, none of which has been evaluated for eligibility to the *National Register of Historic Places*. Native Americans are familiar with some of these sites, which include a series of painted and pecked rock art, along the cliff immediately west of the candidate intermodal transfer station site (DIRS 155826-Nickens and Hartwell 2001, Table 8). The rock art is adjacent to the flat area where DOE could construct an intermodal transfer station. Although direct impacts to the site would be unlikely, indirect impacts are a possibility. Native Americans would view the presence of an intermodal transfer station near a traditional site as an impact to their cultural values.

Operations. The use of existing highways for heavy-haul truck transport of spent nuclear fuel and high-level radioactive waste would be unlikely to affect historic buildings listed in the National Register

district in the Town of Goldfield. Transport of these materials could affect Native American feelings for the potentially significant cultural areas identified along the highways.

The operation of a Caliente intermodal transfer station could have a lasting impact on the cultural integrity of the location, which Native Americans have identified as an important place.

6.3.3.2.1.5 Caliente Route Occupational and Public Health and Safety

This section addresses potential impacts to occupational and public health and safety from upgrading highways and heavy-haul truck operations on the Caliente route. Impacts of the associated intermodal transfer station are the same for each heavy-haul truck implementing alternative and are in Section 6.3.3.1.

Highway Construction and Upgrades. Industrial safety impacts on workers from the upgrade of highways and use of the Caliente route would be small (see Table 6-93). The analysis evaluated the potential for impacts in terms of total reportable cases of injury, lost workday cases, fatality risks for workers, and traffic-related fatalities due to commuting workers and transporting construction materials and equipment. Table 6-94 lists the estimated fatalities from construction vehicle and commuter traffic.

Table 6-93. Impacts to workers from industrial hazards during the Caliente route construction upgrades.

Group and industrial hazard category	Construction[a]	Operations[b]
Involved workers		
Total recordable cases[c]	66	220
Lost workday cases	33	120
Fatalities	0.09	0.61
Noninvolved workers[d]		
Total recordable cases	4.0	13
Lost workday cases	1.5	4.7
Fatalities	0.004	0.01
Totals[e]		
Total recordable cases	70	240
Lost workday cases	34	127
Fatalities	0.1	0.6

a. Impacts are totals for about 35 months.
b. Includes impacts from periodic resurfacing and maintenance; impacts are totals for 24 years.
c. Total recordable cases includes injury and illness.
d. The noninvolved worker impacts are based on 25 percent of the involved worker level of effort.
e. Totals might differ from sums due to rounding.

Operations. The incident-free radiological impacts listed in Table 6-95 would occur during the routine transportation of spent nuclear fuel and high-level radioactive waste using the Caliente route. These impacts include transportation along the highway route as well as transportation along railways in Nevada to the Caliente intermodal transfer station. The table includes the impacts of 1,079 legal-weight truck shipments from commercial sites that do not have the capability to load rail casks while operational.

Table 6-94. Estimated number of fatalities from construction material delivery vehicles and construction and operations worker commuting traffic for the Caliente route for heavy-haul trucks.[a]

Activity	Kilometers[b]	Traffic fatalities	Vehicle emissions fatalities
Construction[c]			
Material delivery vehicles	60,000,000	1.0	0.12
Commuting workers	50,000,000	0.5	0.07
Subtotals[d]	*110,000,000*	*1.5*	*0.19*
Operations[e]			
Commuting workers	200,000,000	2.0	0.26
Totals	***310,000,000***	***3.5***	***0.45***

a. Includes impacts from the construction and operation of an intermodal transfer station.
b. To convert kilometers to miles, multiply by 0.62137.
c. Impact totals are for about 35 months.
d. Totals might differ from sums of values due to rounding.
e. Impact totals are for 24 years.

Table 6-95. Health impacts from incident-free Nevada transportation for the Caliente route implementing alternative.[a]

Category	Legal-weight truck shipments[b]	Rail and heavy-haul truck shipments[c]	Totals[d]
Involved workers			
Collective dose (person-rem)	38	1,600	1,600
Estimated latent cancer fatalities	0.02	0.64	0.66
Public			
Collective dose (person-rem)	7	70	77
Estimated latent cancer fatalities	0.003	0.04	0.04
Estimated vehicle emission-related fatalities	0.0016	0.015	0.016

a. Impacts are totals for 24 years.
b. Impacts of 1,079 legal-weight truck shipments from six commercial sites.
c. Includes impacts to workers at an intermodal transfer station and impacts to escorts.
d. Totals might differ from sums of values due to rounding.

6.3.3.2.1.6 Caliente Route Socioeconomics

This section describes potential socioeconomic impacts that would occur from upgrading highways on the Caliente route and building an intermodal transfer station for heavy-haul truck transportation. The discussion includes impacts from the operation of an intermodal transfer station at the Caliente site and periodic resurfacing of highways.

Highway Construction and Upgrades. Socioeconomic impacts from upgrading highways for a Caliente route and building an intermodal transfer station would be temporary, occurring over a short period and spread among the counties along the route. Upgrading the roads for the route would cost about $125 million, and would require about 653,000 worker hours and 35 months to complete. Constructing an intermodal transfer station would cost $25 million and require approximately 18 months to complete. (Dollar values reported in this section are 2001 dollars unless stated otherwise.)

Employment. In the region of influence, increased employment of construction workers involved with upgrading highways or with building an intermodal transfer station (direct workers) and other workers employed as a result of the economic activity generated by the project (indirect workers) would peak in 2008 at about 856 workers. The increase in employment in Clark County would be about 748 workers; Nye and Lincoln Counties would each gain 54. The increases in Clark and Nye Counties would be less than 1 percent of the employment baseline for each county. The increase in Lincoln County employment would be 2.2 percent of the county's employment baseline.

In the three-county region of influence, employment of Caliente route construction workers and of indirect workers would decrease by 738 jobs when the construction of an intermodal transfer station and highway upgrades ended in 2009. At the completion of the construction phase, Clark County would lose 720 of these jobs, Nye County would lose 6, and Lincoln County would lose 12. The impacts would be less than 1 percent of the baselines in Clark and Nye Counties. DOE anticipates that project-related workers would be absorbed in other work in Nevada. Employment projections for the State estimate 1.4 million jobs in 2010.

Population. Projected population increases in the region of influence as a consequence of upgrading highways and constructing an intermodal transfer station for the Caliente route would peak in 2009. During that year, the incremental increase in population would be about 688 individuals. Ninety-one percent (627) of these individuals would live in Clark County, 42 in Nye County, and 18 in Lincoln County. Population changes for Clark, Lincoln, and Nye Counties that would arise from increased employment opportunities would be less than 1 percent of each county's population baseline. Because the increases in each county could be small and transient, impacts to schools or housing would be unlikely.

Economic Measures. Economic measures would rise during the construction of an intermodal transfer station and upgrading of highways, and would decline at the project's end. The temporary change in real disposable income of people in the three-county region of influence would peak in 2008 at $26.5 million. The region-wide change in Gross Regional Product would peak in 2008 at $45.3 million. Increased State and local government expenditures resulting from activities to upgrade highways and construct an intermodal transfer station would peak in 2009 at $2.3 million. The Gross Regional Product, real disposable income, and expenditures by local and State governments would be less than 1 percent higher than the baseline for Clark and Nye Counties. Lincoln County would experience a less-than-1-percent increase in real disposable income and government spending. The increase in Gross Regional Product ($1.4 million) would be 1.2 percent of the county's baseline. (Dollar values reported in this section are in 2001 dollars unless otherwise stated.)

Transition to Operations. In the region of influence, employment of Caliente heavy-haul truck route workers and indirect (support) workers would decrease by 738 when construction of the intermodal transfer station and highway upgrades ended in 2009. Clark County would lose 721 (98 percent) of these jobs. Nye County would lose 5 jobs, and Lincoln County would lose 12 jobs. DOE anticipates that some of the displaced workers would move into operational positions on the Caliente route while others would find other work in the State. While this project would lose jobs, employment projections for the State estimate approximately 1.4 million jobs in 2010, or about 999,500 in the region of influence.

Operations. Operations at an intermodal transfer station and the use of heavy-haul trucks would begin in 2010 and continue until 2033. An annual operations workforce of about 26 would be required for an intermodal transfer station, which would operate throughout the year. The direct workforce for heavy-haul truck operations over a Caliente route, including shipment escorts, would be about 120 workers. The analysis assumed that operations workers would reside in Clark, Lincoln, or Nye Counties.

Employment. Employment probably would remain relatively level throughout the operations period. Total employment (direct and indirect) in the region of influence associated with heavy-haul truck transportation and an intermodal transfer station would average about 274 workers. The baseline employment in the region of influence in the 24-year operations period would be about 1.1 million. Firms in the region of influence would employ about 94 percent of these workers. Clark County would gain 111 workers. Nye County would gain 74, and Lincoln County would gain 88. The increases in Clark and Nye Counties would be less than 1 percent of the respective baselines. The increase in Lincoln County would represent 3.3 percent of the county's employment baseline.

Because of the periodic need to resurface highways used by heavy-haul trucks (every 8 years starting in 2016), employment would increase in the years these projects occurred. For these projects, employment (direct and indirect) in the region would increase by about 250 workers. Employment changes from periodic highway-resurfacing projects would be less than 1 percent of the baseline in Clark County. DOE assumed that Clark County-based firms would employ the resurfacing project workers. DOE included the employees who would resurface the roads and their families in the employment and population estimates discussed above for the operations period. Overall impacts to employment and population as a result of highway maintenance and shipment operations would be less than 1 percent of the baselines in each county.

Population. The average annual increase in population in the region of influence as a result of employment associated with a Caliente heavy-haul truck route would be about 638 persons. DOE estimates that about 387 of these would reside in Clark County, about 134 in Nye County, and 117 in Lincoln County. Population increases for Lincoln County, which would experience the largest change as a percentage of the baseline, would be about 2.4 percent.

The change in population in Lincoln County would include an average annual increase of approximately 27 school-aged children. The impact to housing in the county would be negligible given the county's historically high housing vacancy rates (see Chapter 3, Section 3.1.7.4). Impacts attributable to the operation of the Caliente heavy-haul truck route would be within the range of historic changes in the county.

Economic Measures. In the region of influence, real disposable income from the operation of an intermodal transfer station in Caliente, operation of heavy-haul trucks based in Caliente, and periodic resurfacing of the roads would rise during operations, starting at $4.1 million in 2010 and rising to $22 million in 2033. The average annual impact in real disposable income would be $12.9 million. Gross Regional Product would also rise during operations, increasing to $29 million in 2033 and averaging $15.3 million. Annual State and local government expenditures attributable to this heavy-haul truck implementing alternative would increase from $2.2 million in 2010 to $4.0 million in 2033, with an annual average of $2.9 million. The impact of changes in the economic measures of Gross Regional Product, real disposable income, and expenditures by State and local governments would be less than 1 percent for Clark and Nye Counties. The impact in Lincoln County would be more visible. Changes in real disposable income would average 2.4 percent of the baseline, the impact in Gross Regional Product would average 3.7 percent of the baseline, and the change in expenditures by State and local governments would average 2.9 percent of the baseline in the county.

In addition, DOE analyzed a sensitivity case that assumed all Lincoln County socioeconomic impacts would occur only in the City of Caliente. Under this assumption, City population would rise by 3 percent during construction and by about 8.7 percent during operations. Employment would rise by about 11 percent during construction and about 12 percent during operations.

6.3.3.2.1.7 Caliente Route Noise and Vibration

Section 6.3.3.1 discusses the noise impacts common to all heavy-haul truck implementing alternatives. This section focuses on noise impacts that would be unique to the Caliente heavy-haul truck implementing alternative.

Highway Construction and Upgrades. The Caliente intermodal transfer station would border a wastewater-treatment facility consisting of drain fields and ponds. There is a single dwelling about 500 meters (1,600 feet) to the northeast of a 0.26-square kilometer (64-acre) parcel that has been identified as a potential site for the Caliente intermodal transfer station. However, this residence is behind a small rise and would be partially shielded from operations at an intermodal transfer station. As a consequence, the potential for noise impacts from construction and operations would be very low at this location.

Operations. Existing traffic on the candidate routes for heavy-haul trucks includes a significant component of tractor-trailer vehicles. Because the intermodal transfer station would be on the western edge of Caliente, traffic to and from the station would not travel through town. Traffic noise impacts in Caliente would be inconsequential. The increase in 1-hour average noise levels would be greatest near Rachel, where traffic volumes are lowest. The estimated elevation of background traffic noise would be 4.7 dBA 15 meters (49 feet) from the road. The estimated baseline traffic noise level of 59.2 dBA would increase to 63.9 dBA when heavy-haul trucks passed Rachel. Estimated traffic noise levels in Tonopah, Goldfield, and Beatty would increase by 0.3 to 2.0 dBA. These small increases in noise levels would not be discernable when compared to existing background levels of current tractor-trailer noise in these communities. Heavy-haul trucks would add only a small increment to the existing baseline noise level associated with traffic on these routes. U.S. 95 is a major transportation corridor for the trucking industry from central California to Las Vegas. U.S. 6, State Route 373 and U.S. 93 (from Crystal Springs to Caliente) carry less traffic than U.S. 95. Ground vibrations would not affect any historic buildings because of the low speeds that heavy-haul trucks would use when passing through Goldfield. No sensitive ruins of cultural significance have been identified along this route.

The Caliente route passes the northeastern border of the Timbisha Shoshone Trust Lands parcel on U.S. 95. Estimated mean 1-hour increases in traffic noise due to heavy-haul trucks in this area would be 0.8 dBA over existing background traffic noise (DIRS 155825-Poston 2001, all). This level of increase would not cause adverse impacts.

6.3.3.2.1.8 Caliente Route Aesthetics

A Caliente intermodal transfer station would be located near the entrance to Kershaw-Ryan State Park. In addition, park visitors would receive short-term visual impacts from construction activities. Park visitors could also be affected by noise from construction activities that could lessen their recreational experience. These short-term impacts would exist only during construction.

During operation of the intermodal transfer station, noise and lighting probably would be discernible from Kershaw-Ryan State Park, especially during night operations, and would probably detract from the recreational experience. The use of shielded and directional-lighting would limit the amount of viewable light from outside the facility operational area.

6.3.3.2.1.9 Caliente Route Utilities, Energy, and Materials

Section 6.3.3.1 discusses the utilities, energy, and materials impacts that would be common to the heavy-haul truck implementing alternatives. This section focuses on the utilities, energy, and materials impacts that would be unique to the Caliente heavy-haul truck implementing alternative.

Highway Construction and Upgrades. The construction of the Caliente intermodal transfer station would have the same utilities, energy, and materials impacts as those discussed in Section 6.3.3.1.

Table 6-96 lists the estimated quantities of primary materials for the upgrade of Nevada highways for the Caliente route. These quantities are not likely to be very large in relation to the southern Nevada regional supply capacity (see Section 6.3.3.1).

Table 6-96. Utilities, energy, and materials required for upgrades along the Caliente route.

Route	Length (kilometers)[a]	Diesel fuel (million liters)[b]	Gasoline (thousand liters)	Asphalt (million metric tons)[c]	Concrete (thousand metric tons)	Steel[d] (metric tons)
Caliente	533	13	220	1.4	1.8	49.3

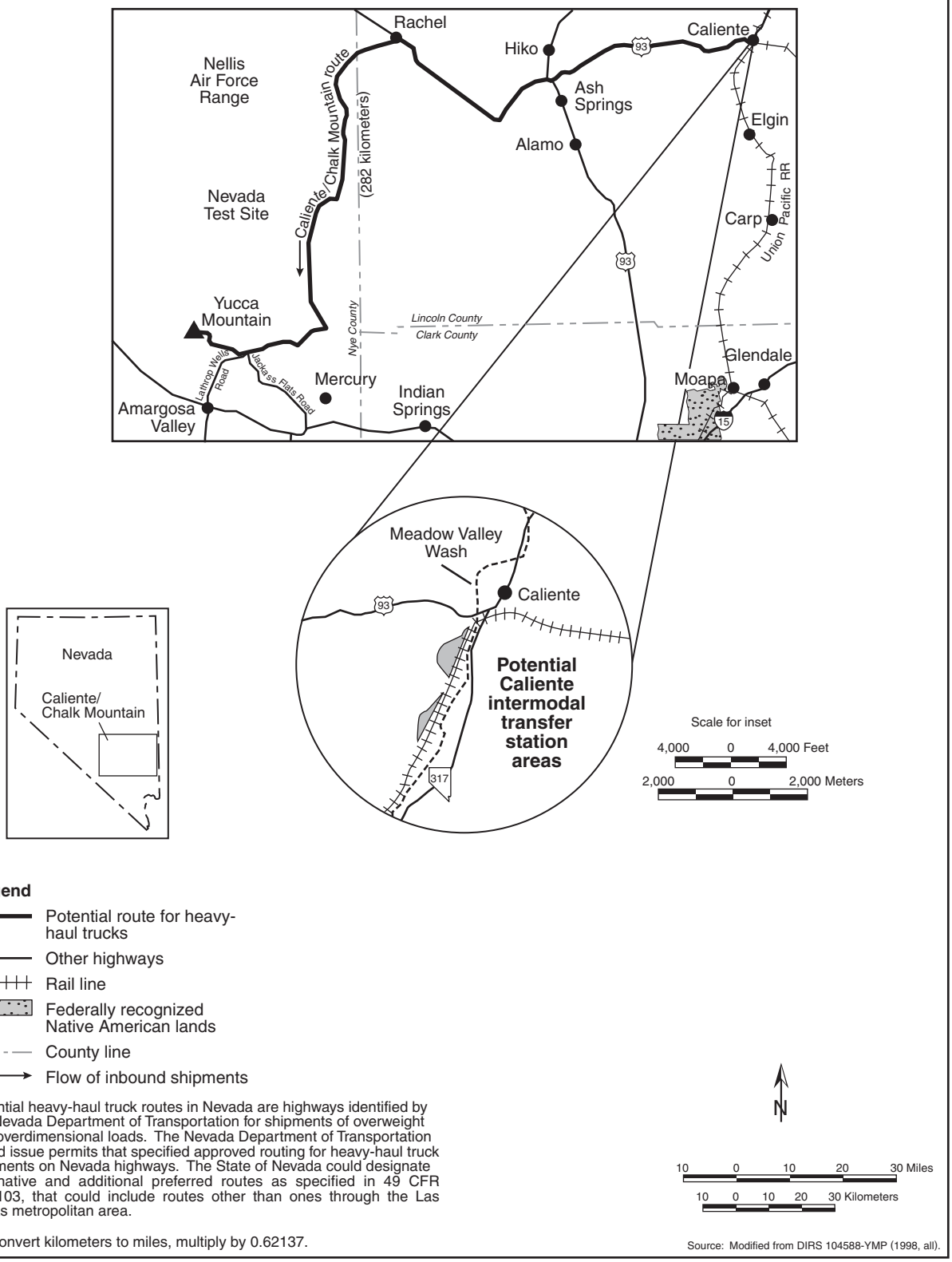
a. To convert kilometers to miles, multiply by 0.62137.
b. To convert liters to gallons, multiply by 0.26418.
c. To convert metric tons to tons, multiply by 1.1023.
d. Steel includes rebar only.

Operations. Section 6.3.3.1 discusses the utilities, energy, and material needs for operation of an intermodal transfer station.

Fossil fuel that would be consumed by heavy-haul trucks during operations is discussed in Chapter 10, which addresses irreversible commitments of resources.

6.3.3.2.2 *Caliente/Chalk Mountain Route Implementing Alternative*

The Caliente/Chalk Mountain route (Figure 6-23) is approximately 282 kilometers (175 miles) long. Heavy-haul trucks and escorts leaving an intermodal transfer station in the Caliente area would travel directly from the station to U.S. 93. The trucks would travel on U.S. 93 to State Route 375, then on State Route 375 to the Town of Rachel. Next they would head south on Valley Road through the Nellis Air Force Range past Chalk Mountain to the Groom Pass Gate to the Nevada Test Site.



Potential heavy-haul truck routes in Nevada are highways identified by the Nevada Department of Transportation for shipments of overweight and overdimensional loads. The Nevada Department of Transportation would issue permits that specified approved routing for heavy-haul truck shipments on Nevada highways. The State of Nevada could designate alternative and additional preferred routes as specified in 49 CFR 397.103, that could include routes other than ones through the Las Vegas metropolitan area.

To convert kilometers to miles, multiply by 0.62137.

Source: Modified from DIRS 104588-YMP (1998, all).

Figure 6-23. Caliente/Chalk Mountain heavy-haul truck route.

DOE would construct a parking area along a Caliente/Chalk Mountain route near the northern boundary of the Nellis Air Force Range to enable heavy-haul vehicles to park overnight. This parking area could be needed because the travel time (vehicle in motion plus periodic short stops for inspections) associated with a Caliente/Chalk Mountain route would be as much as 8 hours and because (1) DOE anticipates restrictions on the times trucks could travel across the Nellis Air Force Range and (2) special travel permits issued by the State of Nevada for the trucks would include time-of-day and day-of-the-week travel restrictions. The estimated life-cycle cost to construct and operate an intermodal transfer station and to operate heavy-haul trucks along the Caliente/Chalk Mountain route would be about $548 million in 2001 dollars.

Section 6.3.3.2.1 discusses the Caliente siting areas for an intermodal transfer station.

The following sections address impacts that would occur to land use; biological resources and soils; cultural resources; hydrology including surface water and groundwater; occupational and public health and safety; socioeconomics; noise and vibration; aesthetics and utilities, energy, and materials. Impacts that would occur to air quality, and waste management would be the same as those discussed in Section 6.3.3.1 and are, therefore, not repeated here. Section 6.3.4 discusses the potential for transportation activities to cause environmental justice impacts in Nevada.

6.3.3.2.2.1 Caliente/Chalk Mountain Route Land Use and Ownership

This section describes anticipated land-use impacts that could occur from the construction and operation of the Caliente intermodal transfer station, upgrades of highways, and heavy-haul truck operations over the Caliente/Chalk Mountain route. Chapter 3, Section 3.2.2.2.1, describes the Caliente intermodal transfer station site and the associated route to the Yucca Mountain site.

Highway Construction and Upgrades. Section 6.3.3.2.1 discusses Caliente intermodal transfer station impacts in relation to the current use of the land and the surrounding area. Section 6.3.3.1 describes impacts on land use from upgrading highways for use by heavy-haul trucks.

In addition to the impacts on land use discussed in Section 6.3.3.1 for upgrading Nevada highways, approximately 1.3 square kilometers (310 acres) of land would be disturbed by the road upgrades and additional construction activities required for this route. Table 6-97 summarizes these disturbances. Approximately 0.04 square kilometer (10 acres) of land in the vicinity of the northern boundary of the Nellis Air Force Range would be acquired for a midroute stopping area for heavy-haul trucks.

Table 6-97. Land disturbances along the Caliente/Chalk Mountain heavy-haul truck route.

Disturbance	Area disturbed [a] (square kilometers) [b]
Haul road disturbed area	0.6
Aggregate plants	0.1
Road widening	0.3
Passing lanes	0.1
Truck turnouts	0.02
Fortymile Wash new road	0.04
Overnight stops	0.04
Total disturbed area	1.3

a. Numbers approximate due to rounding.
b. To convert square kilometers to acres, multiply by 247.1.

The Caliente/Chalk Mountain route would involve land controlled by the Nellis Air Force Range (also known as the Nevada Test and Training Range), which, according to the Air Force, would affect Air Force operations. Because the Military Lands Withdrawal Act of 1999 (Public Law 106-65, 113 Stat. 885) withdraws and reserves the Nellis Air Force Range for use by the Secretary of the Air Force, the Secretary would need to concur with a decision to operate a heavy-haul truck route through any part of the Range. The Air Force has identified national security issues regarding a Caliente/Chalk Mountain route, citing interference with Nellis Air Force Range testing and training activities. In response to Air Force concerns, DOE has stated that it is acutely

conscious of the security issues such a route would present and, because of the concerns expressed by the Air Force, regards the route as a "non-preferred alternative."

Operations. The Air Force has identified national security issues regarding operations of heavy-haul trucks on the Caliente/Chalk Mountain route, citing interference with Nellis Air Force Range testing and training activities. There would be no other direct land-use impacts associated with the operation of the Caliente intermodal transfer station or the Caliente/Chalk Mountain route except those described above and in Section 6.3.3.1.

6.3.3.2.2.2 Caliente/Chalk Mountain Route Hydrology

DOE anticipates that limited impacts to surface water and groundwater would occur in the course of improving Nevada highways so that they could accommodate daily use by heavy-haul trucks. This section discusses these potential environmental impacts as well as those from the construction and operation of an intermodal transfer station and operation of the Caliente/Chalk Mountain route. Section 6.3.3.1 discusses the hydrological impacts that would be common to all the heavy-haul truck implementing alternatives. This section focuses on the hydrology impacts that would be unique to the Caliente/Chalk Mountain route.

Surface Water

Section 6.3.3.1 discusses the impacts to surface water from the construction and operation of an intermodal transfer station and upgrades to highways.

Appendix L contains a comparison of what is known about the floodplains, springs, and riparian areas at the three candidate intermodal transfer station sites (see Sections L.3.2.6 and L.4.2.2). As noted in Section L.3.2.6, the two locations being considered for the Caliente intermodal transfer station are outside the 100-year flood zone of Meadow Valley Wash, but inside the 500-year flood zone.

Groundwater

Highway Construction and Upgrades. Section 6.3.3.1 discusses the impacts to groundwater from the construction of an intermodal transfer station. Groundwater impacts from upgrading highways would be limited to those caused by the use of water from construction wells. Upgrades to the Caliente/Chalk Mountain route would require about 75,000 cubic meters (60 acre-feet) of water (DIRS 104917-LeFever 1998, all) that the analysis assumed would come from five wells.

The average amount of water withdrawn from each well would be about 15,000 cubic meters (12 acre-feet). Chapter 3, Section 3.2.2.2.3, identifies hydrographic areas over which the Caliente/Chalk Mountain route would pass, their perennial yields, and whether the State considers each a Designated Groundwater Basin. Table 6-98 summarizes the status of the hydrographic areas associated with the Caliente/Chalk Mountain heavy-haul truck route. It also identifies the approximate percentage of the route that would pass over Designated Groundwater Basins.

Table 6-98. Hydrographic areas along Caliente-Chalk Mountain route.

Hydrographic areas	Designated Groundwater Basins	
	Number	Percent of corridor length
10	2	20

The withdrawal of 15,000 cubic meters (12 acre-feet) a year from a well would have little impact on the hydrographic areas associated with the Caliente/Chalk Mountain route based on their perennial yields (Chapter 3, Section 3.2.2.2.3), even if multiple wells were placed in the same hydrographic area. As indicated in Table 6-98, about 20 percent of the route's length would be in areas with Designated Groundwater Basins, which the Nevada State Engineer's office watches carefully for the potential for groundwater depletion. This does not mean that a contractor could not obtain water appropriations in these areas; the State Engineer would have the authority to approve such appropriations. The fact that

requests for water appropriations under this action would be for minor amounts and for a short-term construction action should provide the State Engineer even more discretion. Other options would be to lease temporary water rights from individuals along the route, ship water from other permitted resources by truck (4,000 truckloads) to construction sites, or use a combination of these two actions. Obtaining a water appropriation from the State Engineer for short-term construction use or using an approved allocation should ensure that groundwater resources would not be adversely affected.

Operations. Section 6.3.3.1 discusses the impacts to groundwater from the operation of an intermodal transfer station, highway maintenance, and heavy-haul truck operations.

6.3.3.2.2.3 Caliente/Chalk Mountain Route Biological Resources and Soils

Section 6.3.3.1 discusses impacts to biological resources from the construction and operation of an intermodal transfer station and upgrades to highways that would be common to all candidate sites for an intermodal transfer station and routes. This section discusses the construction- and operations-related impacts that would be unique to the Caliente intermodal station and Caliente/Chalk Mountain route.

Highway Construction and Upgrades. Section 6.3.3.2.1 discusses potential Caliente intermodal transfer station site locations and impacts to biological resources from station construction.

The predominant land cover types along the Caliente/Chalk Mountain route are salt desert scrub, blackbrush, sagebrush, and creosote-bursage (DIRS 104593-CRWMS M&O 1999, p. 3-31). The regional area for each vegetation type is extensive (DIRS 104593-CRWMS M&O 1999, pp. C1 to C5). Because areas disturbed by highway upgrade activities would be in or adjacent to existing rights-of-way, and because these areas have been previously degraded by human activities, impacts would be small. In addition, vegetation would be removed from approximately 0.04 square kilometer (10 acres) of undisturbed land for development of a midroute stopover. This area would be near or outside the boundary of Nellis Air Force Range. The precise location is not known at this time, so the land cover type that would be disturbed cannot be identified. However, as noted above, all land cover types along the route are extensive and often degraded in the region, so the loss of this area would be unlikely to cause adverse effects to the population of any plant or animal species.

Two threatened or endangered species occur along the route (DIRS 104593-CRWMS M&O 1999, p. 3-32). The desert tortoise occurs along the southern part of the route from the northern end of Frenchman Flat to Yucca Mountain. Construction activities could kill or injure desert tortoises; however, their abundance is low in this area (DIRS 101914-Rautenstrauch and O'Farrell 1998, pp. 407 to 411), so losses would be few. One endangered species—the Hiko White River springfish—occurs in Crystal Springs (DIRS 103262-FWS 1998, p. 16), which is about 10 meters (33 feet) south of State Route 375 near its intersection with State Route 318 near U.S. 93. Construction or widening of the road would be unlikely to affect this species because construction activities would avoid the spring outflow channel, and DOE would implement mitigation measures to ensure that no sediment would enter the stream, which is critical habitat for this fish (50 CFR 17.95). Three other special status species occur along this route, but because construction activities would occur along existing roads, they should not be affected. Standard construction practices would be used to reduce erosion and runoff. In addition, formal consultation with the U.S. Fish and Wildlife Service would be initiated if this heavy-haul truck route was selected, and DOE would implement all terms and conditions required by the Service.

This route would cross six areas designated as game habitat (DIRS 104593-CRWMS M&O 1999, p. 3-32). The amount of habitat in these areas would be reduced very slightly due to construction activities along existing roads. Game animals could be disturbed if they were in these areas during construction.

Three springs or riparian areas occur near this route (DIRS 104593-CRWMS M&O 1999, p. 3-32). These springs and riparian areas may be jurisdictional wetlands or other waters of the United States; however,

no formal delineation has been made. DOE would implement mitigation measures to ensure that construction would not increase sedimentation in these areas. The route crosses a number of ephemeral streams that may be classified as waters of the United States. DOE would work with the State of Nevada and the U.S. Army Corps of Engineers to minimize impacts to these areas and would obtain individual or regional permits, as appropriate.

Impacts to soils would be transitory and small and would occur only along the shoulders of existing roads.

Operations. Impacts from operations would include periodic disturbances of wildlife from additional truck traffic along this route. Trucks probably would kill individuals of some species but losses would be few and unlikely to affect regional populations of any species. No additional habitat loss would occur during operations. Impacts to soils would be small.

6.3.3.2.2.4 Caliente/Chalk Mountain Route Cultural Resources

Highway Construction and Upgrades. Upgrades to U.S. 93 and State Route 375 would create similar impacts (such as disturbing sites or crushing artifacts) for archaeological, historic, and Native American resources as those identified with the use of the Caliente heavy-haul truck route. Potential impacts at the Caliente intermodal transfer station would also be the same.

Surveys have recorded 31 archaeological sites, five of which have been evaluated as being potentially significant. One is a historic mining camp that has not been evaluated. Additional field surveys would be necessary to record and evaluate cultural resource sites along the route segment from State Route 375 to Yucca Mountain, along with field ethnographic studies. Within the Nevada Test Site, the National Register-listed historic property of Sedan Crater would be located close to, but at a presently unspecified distance, from the proposed new route heavy-haul segment. If this route is selected, final engineering of the alignment would determine if there would be any potential impacts to this historic property.

Table 6-99. Impacts to workers from industrial hazards from upgrading highways along the Caliente/Chalk Mountain route.

Group and industrial hazard category	Construction[a]	Operations[b]
Involved workers		
Total recordable cases[c]	35	220
Lost workday cases	17	120
Fatalities	0.05	0.61
Noninvolved workers		
Total recordable cases	2.1	13
Lost workday cases	0.8	4.7
Fatalities	0.002	0.01
otals[d]		
Total recordable cases	37	240
Lost workday cases	18	130
Fatalities	0.05	0.62

a. Impacts are totals over about 2 years.
b. Includes impacts from periodic maintenance and resurfacing. Impacts are totals over 24 years.
c. Total recordable cases includes injury and illness.
d. Totals might differ from sums due to rounding.

Operations. Impacts from the use of the Caliente/Chalk Mountain route from the Caliente intermodal transfer station to the point at which it leaves State Route 375 would be the same as those identified for the Caliente route in Section 6.3.3.2.1.

6.3.3.2.2.5 Caliente/Chalk Mountain Route Occupational and Public Health and Safety

This section addresses potential impacts to occupational and public health and safety from upgrading highways and heavy-haul truck operations on the Caliente/Chalk Mountain route. Impacts of the associated intermodal transfer station in Caliente would be the same as those discussed in Section 6.3.3.1.

Highway Construction and Upgrades. Industrial safety impacts to workers from upgrading highways for the Caliente/Chalk Mountain route would be small (Table 6-99). The analysis evaluated the potential for impacts in terms of total reportable cases of injury, lost workday cases, fatality risks for workers, and traffic-related fatalities related to

commuting workers and the movement of construction materials and equipment. Table 6-100 lists the estimated fatalities from construction and commuter vehicle traffic.

Table 6-100. Estimated number of fatalities from construction material delivery vehicles and construction and operations worker commuting traffic for the Caliente/Chalk Mountain route for heavy-haul trucks.

Activity	Kilometers[a]	Traffic fatalities	Vehicle emissions fatalities
Construction[b]			
Material delivery vehicles	18,000,000	0.3	0.04
Commuting workers	30,000,000	0.3	0.04
Subtotals	*48,000,000*	*0.6*	*0.08*
Operations[c]			
Commuting workers	180,000,000	1.8	0.24
Totals[d]	***230,000,000***	***2.4***	***0.32***

a. To convert kilometers to miles, multiply by 0.62137.
b. Impacts are totals over about 2 years.
c. Impacts are totals over about 24 years.
d. Totals might differ from sums of values due to rounding.

Operations. The incident-free radiological impacts listed in Table 6-101 would occur during the routine transportation of spent nuclear fuel and high-level radioactive waste using the Caliente/Chalk Mountain route. These impacts include transportation along the route and along railways in Nevada leading to an intermodal transfer station. The table includes the impacts of 1,079 legal-weight truck shipments from commercial sites that do not have the capability to load rail casks while operational.

Table 6-101. Impacts from incident-free transportation for the Caliente/Chalk Mountain heavy-haul truck implementing alternative.[a]

Category	Legal-weight truck shipments	Rail and heavy-haul truck shipments[b]	Totals[c]
Involved workers			
Collective dose (person-rem)	38	1,200	1,200
Estimated latent cancer fatalities	0.02	0.48	0.5
Public			
Collective dose (person-rem)	7	60	70
Estimated latent cancer fatalities	0.003	0.03	0.03
Estimated vehicle emission-related fatalities	0.0016	0.0063	0.0079

a. Impacts are totals for 24 years.
b. Includes impacts to workers at an intermodal transfer station and impacts to escorts.
c. Totals might differ from sums of values due to rounding.

6.3.3.2.2.6 Caliente/Chalk Mountain Route Socioeconomics

This section describes potential socioeconomic impacts that would occur from upgrading highways along the Caliente/Chalk Mountain route and building an intermodal transfer station for heavy-haul truck transportation. The discussion includes the impacts from the operation of an intermodal transfer station at Caliente and periodic resurfacing of the highways.

Highway Construction and Upgrades. Socioeconomic impacts from upgrading public highways, roads on the Nellis Air Force Range, and roads on the Nevada Test Site for a Caliente/Chalk Mountain route and for building an intermodal transfer station would be temporary, occurring over a short period and spread among the counties along the route. Employment for highway upgrades and intermodal transfer station construction would involve workers laboring for about 241,000 worker hours. Upgrading the highways along this route would cost about $65.6 million and would require 26 months to complete.

Constructing an intermodal transfer station would cost $25 million and require 18 months. (Dollar values reported in this section are 2001 dollars unless otherwise stated.)

Employment

In the region of influence, increased employment of construction workers involved with upgrading the highways or with building an intermodal transfer station (direct workers) and of other workers employed as a result of the economic activity generated by the project (indirect workers) would peak in 2008 at about 751 new jobs. The increase in employment for Clark County would be about 650 workers and Nye County would gain 44 workers. These increases represent less than 1 percent of each county's employment baseline. For Lincoln County, the increase in employment would be as much as 57 workers or 2.3 percent of the employment baseline. Changes in Lincoln County would be primarily the result of indirect employment created by the spending of construction workers.

Population

Changes in population in the region of influence as a consequence of construction work would peak in 2009. During that year, the incremental increase in population would be about 463 individuals. Clark County would experience 91 percent of the change. Population changes for Clark, Lincoln, and Nye Counties from increased employment would be less than 1 percent of each county's baseline. Because employment and population impacts arising from highway upgrade and the construction of an intermodal transfer station for the Caliente/Chalk Mountain route projects would be small and transient, impacts to schools or housing would be unlikely.

Economic Measures

Economic measures would rise during the construction of an intermodal transfer station and upgrading of highways. The increase in real disposable income in the three counties in the region of influence would peak at about $21.8 million in 2009. Gross Regional Product would peak in 2008 at $39.8 million. Increased State and local government expenditures resulting from highway upgrades and the construction of an intermodal transfer station would reach their peak in 2009 at $1.6 million. Changes to government expenditures and real disposable income would be less than 1 percent of the respective baselines for Clark, Lincoln, and Nye Counties. Changes to Gross Regional Product in Clark and Nye Counties would also be less than 1 percent of the baselines. The increase in Gross Regional Product in Lincoln County would be about 1.2 percent of the county's baseline for that economic measure. (Dollar values reported in this section are in 2001 dollars unless otherwise stated.)

Transition to Operations. In the region of influence, employment of Caliente/Chalk Mountain heavy-haul truck route workers and indirect (support) workers would decrease by 677 when construction of the intermodal transfer station and highway upgrades ended in 2009. Clark County would lose 506 (83 percent) of these jobs. Nye County would lose 41 jobs, and Lincoln County would lose 33 jobs. DOE anticipates that some of the displaced workers would move into operational positions on the Caliente/Chalk Mountain route while others would find other work in the State. While this project would lose jobs, employment projections for the State estimate approximately 1.4 million jobs in 2010, or about 999,500 in the region of influence.

Operations. Operations at an intermodal transfer station and the use of heavy-haul trucks would begin in 2010 and would continue until 2033. An annual operations workforce of 26 would be required for the intermodal transfer station. The workforce for heavy-haul truck operations over a Caliente/Chalk Mountain route, including shipment escorts, would be 110 workers.

Employment

Employment probably would remain relatively level throughout operations. Total employment (direct and indirect) attributable to the Caliente/Chalk Mountain route in the region of influence would average about 237 jobs. Clark County would supply about 87 of the workers, Nye County about 17, and Lincoln

County about 133. The increase in employment in Clark and Nye Counties would be less than 1 percent of each county's employment baseline. The increase in employment in Lincoln County would represent an impact of 4.9 percent of the county's employment baseline.

Because of the periodic need to resurface highways used by heavy-haul trucks (every 8 years starting in 2016), employment would increase in the years during which these projects occurred. For these projects, total employment in the region of influence would increase by about 100 workers for a Caliente/Chalk Mountain route. Employment changes from periodic highway-resurfacing projects would be less than 1 percent of the baseline in Clark County. DOE assumed that resurfacing project workers would live in Clark County. DOE included the workers employed to resurface the roads and their families in the employment and population estimates for the operations period. Impacts to employment and population for the three counties in the region of influence as a consequence of the resurfacing projects would be less than 1 percent of the baselines.

Population

The impact on population in the region of influence would be approximately 506 additional residents. Clark County would gain 296 residents, Nye County would gain 43, and Lincoln County would gain 167. The impact from a population increase in Clark and Nye Counties would be less than 1 percent of each county's baseline. There would no impacts to housing or schools in Clark and Nye Counties. Population increases for Lincoln County, which would experience the largest change, would be approximately 3.5 percent of the baseline. These impacts to employment and population during the operations phase would be within the range of historic changes in the County.

The population change in Lincoln County would include an average annual increase of approximately 38 school-aged children. The impact to housing attributable to the Caliente/Chalk Mountain heavy-haul route would be negligible given the County's historically high housing vacancy rates (see Chapter 3, Section 3.1.7.4).

Economic Measures

In the region of influence, additional real disposable income from the operation of an intermodal transfer station in Caliente, operation of heavy-haul trucks, and periodic resurfacing of the roads would rise throughout operations, starting at $3.9 million in 2010 and increasing to $15.8 million in 2033. The average annual increment in real disposable income would be $11.1 million. Increments to Gross Regional Product would also rise during operations, starting at $2.4 million in 2010, increasing to $20.4 million in 2033, and averaging $13.7 million. Additional annual State and local government expenditures would increase from $1.6 million in 2010 to $3.8 million in 2033, and would average $2.8 million. The increases in real disposable income, Gross Regional Product, and expenditures by governments would be less than 1 percent of the applicable baseline in Clark and Nye Counties. Increases to real disposable income, Gross Regional Product, and government expenditures attributable to the Caliente/Chalk Mountain route would be more visible in Lincoln County. Changes in real disposable income and government expenditures for the county would be about 3.3 and 4.2 percent, respectively, of the baselines. The projected change in Gross Regional Product for the County would be 5.1 percent of the baseline.

In addition, DOE analyzed a sensitivity case that assumed all Lincoln County socioeconomic impacts would occur only in the City of Caliente. Under this assumption, City population would rise by 3 percent during construction and by about 8.7 percent during operations. Employment would rise by about 11 percent during construction and about 12 percent during operations.

6.3.3.2.2.7 Caliente/Chalk Mountain Route Noise and Vibration

Section 6.3.3.1 discusses the noise impacts common to all the heavy-haul truck implementing alternatives. This section focuses on noise impacts that would be unique to the Caliente/Chalk Mountain heavy-haul truck implementing alternative.

Noise impacts of the Caliente intermodal transfer station would be the same as those discussed in Section 6.3.3.2.1. A large portion of the route would be inside the boundaries of the Nevada Test Site and the Nellis Air Force Range. The small rural communities of Crystal Spring and Rachel and the Town of Caliente would be within the 2,000-meter (6,600-foot) region of influence for construction noise.

Existing traffic on the candidate routes for heavy-haul trucks includes a significant component of tractor-trailer vehicles. The increase in 1-hour average noise levels would be greatest near Rachel, where traffic volumes are lowest. The estimated elevation of background traffic noise would be 0.6 dBA 15 meters (49 feet) from the road. The estimated baseline traffic noise level would be 61.4 dBA, which would increase to 62.4 dBA with three heavy-haul trucks passing Rachel. Because the proposed intermodal transfer station would be on the western edge of Caliente and traffic would not travel through town, traffic noise impacts in Caliente would be inconsequential. No historic buildings would be affected by ground vibration.

6.3.3.2.2.8 Caliente/Chalk Mountain Route Aesthetics

A Caliente intermodal transfer station would be near the entrance to Kershaw-Ryan State Park. Park visitors would receive short-term visual impacts from construction activities. In addition, park visitors could be affected by noise from construction activities that could lessen their recreational experience. These short-term impacts would exist only during construction.

During operation of the intermodal transfer station, noise and lighting probably would be discernible from Kershaw-Ryan State Park, especially during night operations, and would probably detract from the recreational experience. The use of shielded and directional lighting would limit the amount of viewable light from outside the facility operational area.

6.3.3.2.2.9 Caliente/Chalk Mountain Route Utilities, Energy, and Materials

Section 6.3.3.1 discusses utilities, energy, and materials impacts that would be common to all the heavy-haul truck implementing alternatives. This section focuses on the utilities, energy and materials impacts that would be unique to the Caliente/Chalk Mountain heavy-haul truck implementing alternative.

Highway Construction and Upgrades. The construction of the Caliente intermodal transfer station would have the same utilities, energy and materials impacts as those discussed in Section 6.3.3.1.

Table 6-102 lists the estimated quantities of primary materials for the upgrade of highways for the Caliente/Chalk Mountain route. These quantities are not likely to be very large in relation to the southern Nevada regional supply capacity (see Section 6.3.3.1).

Table 6-102. Utilities, energy, and materials required for upgrades along the Caliente/Chalk Mountain route.

Route	Length (kilometers)[a]	Diesel fuel (million liters)[b]	Gasoline (thousand liters)	Asphalt (million metric tons)[c]	Concrete (thousand metric tons)	Steel[d] (metric tons)
Caliente-Chalk Mountain	282	4.7	77	0.41	0.5	14

a. To convert kilometers to miles, multiply by 0.62137.
b. To convert liters to gallons, multiply by 0.26418.
c. To convert metric tons to tons, multiply by 1.1023.
d. Steel includes rebar only.

Fossil fuel that would be consumed by heavy-haul trucks during operations is discussed in Chapter 10, which addresses irreversible commitment of resources.

Operations. Section 6.3.3.1 discusses the utilities, energy, and materials needs for the operation of an intermodal transfer station.

6.3.3.2.3 *Caliente/Las Vegas Route Implementing Alternative*

The Caliente/Las Vegas route (Figure 6-24) is approximately 377 kilometers (234 miles) long. Heavy-haul trucks and escorts leaving an intermodal transfer station in the Caliente area would travel directly from the station to U.S. 93. The trucks would travel south on U.S. 93 to the intersection with I-15 northeast of Las Vegas. The trucks would then travel south on I-15 to the exit for the proposed Las Vegas Beltway, and would travel west on the beltway. They would exit the beltway to U.S. 95, and travel north on U.S. 95 to the Mercury entrance to the Nevada Test Site. The trucks would travel on Jackass Flats Road on the Nevada Test Site to the Yucca Mountain site.

DOE would construct a parking area along a Caliente/Las Vegas route to enable heavy-haul vehicles to park overnight. This parking area could be needed because the travel time (vehicle in motion plus periodic short stops for inspections) associated with a Caliente/Las Vegas route would be as much as 9 hours and because DOE anticipates (1) requirements to coordinate travel times with time of reduced traffic flow on the northern portion of the Las Vegas Beltway and (2) special travel permits issued by the State of Nevada for the trucks would include time-of-day and day-of-the-week travel restrictions that could preclude completing a trip in 1 day. This parking area would be near the U.S. 93 and I-15 intersection at Apex. The estimated life-cycle cost of constructing and operating an intermodal transfer station and of operating heavy-haul trucks along the Caliente/Las Vegas route would be about $607 million in 2001 dollars.

Section 6.3.3.2.1 discusses the Caliente siting areas for an intermodal transfer station.

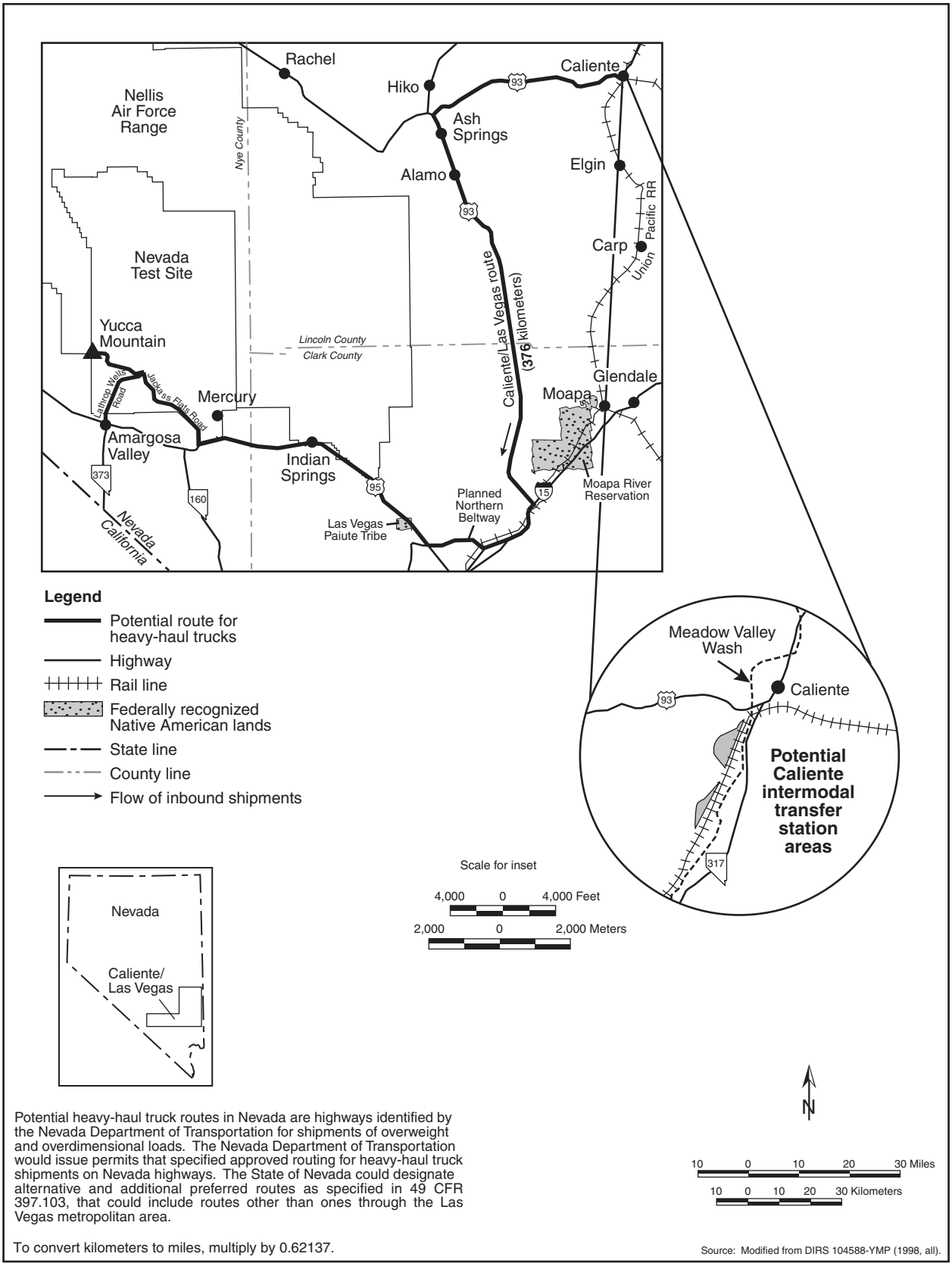
The following sections address impacts that would occur to land use; air quality; biological resources and soils; hydrology including surface water and groundwater; cultural resources; occupational and public health and safety; socioeconomics; noise and vibration; aesthetics; and utilities, energy, and materials. Impacts that would occur to waste management would be the same as those discussed in Section 6.3.3.1 and are, therefore, not repeated here. Section 6.3.4 discusses the potential for transportation activities to cause environmental justice impacts in Nevada.

6.3.3.2.3.1 Caliente/Las Vegas Route Land Use and Ownership

Chapter 3, Section 3.2.2.2.1, describes the Caliente intermodal transfer station site and associated truck route.

Highway Construction and Upgrades. Section 6.3.3.2.1 discusses the Caliente intermodal station site area and impacts related to the current use of the land. Section 6.3.3.1.1 discusses the impacts on land use from upgrading Nevada highways for use by heavy-haul trucks.

In addition to the impacts on land use discussed in Section 6.3.3.1 for upgrading Nevada highways, approximately 2.1 square kilometers (520 acres) of land would be disturbed by the road upgrades and additional construction activities required. Table 6-103 summarizes these disturbances. Approximately 0.04 square kilometer (10 acres) of land in the vicinity of Apex northeast of Las Vegas would be acquired for a midroute stopping area for heavy-haul trucks.



Potential heavy-haul truck routes in Nevada are highways identified by the Nevada Department of Transportation for shipments of overweight and overdimensional loads. The Nevada Department of Transportation would issue permits that specified approved routing for heavy-haul truck shipments on Nevada highways. The State of Nevada could designate alternative and additional preferred routes as specified in 49 CFR 397.103, that could include routes other than ones through the Las Vegas metropolitan area.

To convert kilometers to miles, multiply by 0.62137.

Source: Modified from DIRS 104588-YMP (1998, all).

Figure 6-24. Caliente/Las Vegas heavy-haul truck route.

Operations. There would be no direct land-use impacts associated with the operation of the Caliente intermodal transfer station or use of the Caliente/Las Vegas route other than those described in Section 6.3.3.1.

Table 6-103. Land disturbances along the Caliente/Las Vegas heavy-haul truck route.

Disturbance	Area disturbed[a] (square kilometers)[b]
Haul road disturbed area	1.2
Aggregate plants	0.2
Road widening	0.5
Passing lanes	0.08
Truck turnouts	0.02
Fortymile Wash new road	0.04
Overnight stops	0.04
Mercury turnoff road	0.03
Total disturbed area	2.1

a. Numbers approximate due to rounding.
b. To convert square kilometers to acres, multiply by 247.1.

6.3.3.2.3.2 Caliente/Las Vegas Route Air Quality

This section describes anticipated nonradiological air quality impacts from the construction and operation of an intermodal transfer station and upgrades and heavy-haul truck operation along the Caliente/Las Vegas route. Such impacts would result from releases of criteria pollutants, including nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter (PM_{10}) (see Section 6.3.3.1).

Carbon dioxide and PM_{10} are of particular interest along the Caliente/Las Vegas heavy-haul truck route because highway construction and upgrades and operation of heavy-haul trucks would occur through the Las Vegas Valley air basin, which is classified as a serious nonattainment area for these pollutants (DIRS 101826-FHWA 1996, pp. 3-53 and 3-54).

Highway Construction and Upgrades. Section 6.3.3.1 discusses the method of evaluation of air quality impacts from these activities. The intermodal transfer station for this route would be outside the Las Vegas air quality nonattainment area.

PM_{10} emissions would be an estimated 66 metric tons (73 tons) per year, including estimated emissions for accelerated construction activities for the Northern Beltway. These emissions are 100 percent of the General Conformity threshold level. Extending the construction time and more diligent dust control measures would decrease annual emissions.

Carbon monoxide emissions would be an estimated 54 metric tons (59 tons) per year. These emissions are 59 percent of the General Conformity threshold level.

Operations. Section 6.3.3.1 discusses air quality impacts associated with the operation of the Caliente intermodal transfer station and from emissions of heavy-haul trucks. The Caliente/Las Vegas route would involve heavy-haul trucks passing through the Las Vegas Valley air basin. The air quality impacts to this air basin would be small [0.48 metric ton (0.53 ton) per year of carbon monoxide] with emissions of less than 1 percent of the General Conformity threshold level. These emissions would result from 11 round trips per week through the basin.

6.3.3.2.3.3 Caliente/Las Vegas Route Hydrology

DOE anticipates that limited impacts to surface water and groundwater would occur in the course of improving Nevada highways so they could accommodate daily use by heavy-haul trucks. This section discusses these potential impacts as well as those from the construction and operation of an intermodal transfer station and operation of the Caliente/Las Vegas route. Section 6.3.3.1 discusses the hydrology impacts that would be common to all the heavy-haul truck implementing alternatives. This section focuses on the hydrology impacts that would be unique to the Caliente/Las Vegas heavy-haul truck implementing alternative.

Surface Water

Section 6.3.3.1 discusses impacts to surface water from the construction and operation of an intermodal transfer station and upgrades to highways. The common impacts discussed would apply to surface water along the Caliente/Las Vegas route.

Appendix L contains a comparison of what is known about the floodplains, springs, and riparian areas at the three candidate intermodal transfer station sites (see Sections L.3.2.6 and L.4.2.2). As noted in Section L.3.2.6, the two locations being considered for the Caliente intermodal transfer station are outside the 100-year flood zone of Meadow Valley Wash, but inside the 500-year flood zone.

Groundwater

Highway Construction and Upgrades. Section 6.3.3.1 discusses impacts to groundwater from the construction of an intermodal transfer station. Groundwater impacts from upgrading highways would be limited to those caused by the use of water from construction wells. The upgrades to the Caliente/Las Vegas route would require about 54,000 cubic meters (44 acre-feet) of water (DIRS 104917-LeFever 1998, all) that the analysis assumed would come from seven wells.

Table 6-104. Hydrographic areas along Caliente/Las Vegas route.

	Designated Groundwater Basins	
Hydrographic areas crossed	Number	Percent corridor length represented
13	5	50

The average amount of water withdrawn from each well would be about 7,700 cubic meters (6 acre-feet). Chapter 3, Section 3.2.2.2.3, identifies the hydrographic areas over which the Caliente/Las Vegas route would pass, their perennial yields, and whether the State considers each a Designated Groundwater Basin. Table 6-104 summarizes the status of the hydrographic areas associated with the Caliente/Las Vegas route and identifies the approximate portion of the route that would pass over Designated Groundwater Basins.

The withdrawal of 7,700 cubic meters (6 acre-feet) a year from a well would have little impact on the hydrographic areas associated with the Caliente/Las Vegas route based on their perennial yields (Chapter 3, Section 3.2.2.2.3), even if multiple wells were placed in the same hydrographic area. As indicated in Table 6-104, about 50 percent of the route's length would be in areas with Designated Groundwater Basins, where the potential for groundwater depletion is watched carefully by the Nevada State Engineer's office. This does not mean that a contractor could not obtain water appropriations in these areas; the State Engineer would have the authority to approve such appropriations. The fact that requests for water appropriations under this action would be for minor amounts and for a short-term construction action should provide the State Engineer even more discretion. Other options would be to lease temporary water rights from individuals along the route, ship water from other permitted resources by truck (about 3,000 truckloads) to construction sites, or use a combination of these two actions. Obtaining a water appropriation from the State Engineer for a short-term construction use or using an approved allocation should ensure that groundwater resources would not be adversely affected.

Operations. Section 6.3.3.1 discusses impacts to groundwater from the operation of an intermodal transfer station, highway maintenance, and heavy-haul truck operations.

6.3.3.2.3.4 Caliente/Las Vegas Route Biological Resources and Soils

Section 6.3.3.1 discusses impacts to biological resources from the construction and operation of an intermodal transfer station and upgrades to highways that would be common to all potential sites for an intermodal transfer station and routes. This section discusses construction- and operations-related impacts that would be unique to the Caliente intermodal station and Caliente/Las Vegas route.

Highway Construction and Upgrades. Section 6.3.3.2.1 discusses potential Caliente intermodal transfer station siting locations and impacts to biological resources and soils from construction of the station.

The predominant land cover types along the Caliente/Las Vegas route are creosote-bursage and Mojave mixed scrub (DIRS 104593-CRWMS M&O 1999, p. 3-32). The regional area for each vegetation type is extensive (DIRS 104593-CRWMS M&O 1999, pp. C1 to C5). Because areas disturbed by upgrade activities would be in or adjacent to the existing rights-of-way and the areas have been previously degraded by human activities, impacts would be small.

Four threatened or endangered species occur along the route (DIRS 104593-CRWMS M&O 1999, p. 3-33). The desert tortoise occurs along the southern part of the route from near Alamo to Yucca Mountain (DIRS 103160-Bury and Germano 1994, pp. 57 to 72). An approximately 100-kilometer (62-mile) section of U.S. 93 from Maynard Lake to the junction with I-15 is critical habitat for the desert tortoise (50 CFR 17.95). Slight alterations of habitat immediately adjacent to existing roads would affect desert tortoises because work would occur in the existing right-of-way. Tortoise populations are depleted for more than 1 kilometer (0.6 mile) on either side of roads with average daily traffic greater than 180 vehicles (DIRS 103160-Bury and Germano 1994, pp. 57 to 72). Two endangered species—the Pahranagat roundtail chub and the White River springfish—occur in Ash Springs or its outflow. The route crosses the outflow of Ash Springs, which is designated critical habitat for the White River springfish (50 CFR 17.95). Because improvements would occur on the existing roadway and the Nevada Department of Transportation would use standard practices to reduce erosion and runoff, road improvements would not adversely affect the species living there. Improvements to the existing highway would not affect southwestern willow flycatchers or their habitat in Pahranagat Valley (DIRS 152511-Brocoum 2000, pp. A-9 to A-13). Nine other special status species occur within 100 meters (330 feet) of this route (DIRS 104593-CRWMS M&O 1999, p. 3-33). Four of these species occur at Ash Springs or its outflow, and would not be affected for the reasons stated above for this site. The other five species would not be affected because construction activities would be restricted to the existing right-of-way, so occupied habitat would not be destroyed.

This route would cross eight areas designated as game habitat (DIRS 104593-CRWMS M&O 1999, p. 3-33). Habitat in these areas would be reduced slightly due to construction activities along existing roads. Game animals could be disrupted if they were in these areas during construction and would probably move away until the higher level of activity ceased.

Seven springs, riparian areas, or other wet areas occur near this route (DIRS 104593-CRWMS M&O 1999, p. 3-33). These areas may be jurisdictional wetlands or other waters of the United States. However, no formal delineation has occurred. Construction could increase sedimentation in these areas. The corridor crosses a number of ephemeral streams that may be classified as waters of the United States. DOE would work with the State of Nevada and the U.S. Army Corps of Engineers to mitigate impacts to these areas and would obtain individual or regional permits, as appropriate.

Impacts (such as increased water erosion and removal of land cover resulting in wind erosion) to soils would be transitory and small and would occur only along the shoulders of existing roads.

Operations. Impacts from operations would be minimal but would include periodic disturbances of wildlife by noise from the additional truck traffic along this route. Trucks probably would kill individuals of some species, but losses would be few and unlikely to affect regional populations of any species. No additional habitat loss would occur during operations.

6.3.3.2.3.5 Caliente/Las Vegas Route Cultural Resources

Section 6.3.3.1 discusses impacts to cultural resources that would be common to all the heavy-haul truck implementing alternatives.

Highway Construction and Upgrades. Highway upgrades and construction of the Caliente/Las Vegas heavy-haul truck route would be the same from the Caliente intermodal transfer station to the junction of U.S. 93 and State Route 375, just south of Hiko, as for the Caliente route (see discussion in Section 6.3.3.2.1). Following U.S. 93 south to the Apex area, the route passes through several sites and areas that have been tentatively identified as being important to American Indians (DIRS 155826-Nickens and Hartwell 2001, Table 8). The following places have been identified in the Pahranagat National Wildlife Refuge: the Black Canyon area, the Storied Rocks site farther south, and the Maynard Lake vicinity. The Black Canyon sites are listed on the *National Register of Historic Places.*

Archaeological surveys of the highway rights-of-way along this route have identified 128 archaeological sites, seven of which have been recommended as potentially significant (DIRS 155826-Nickens and Hartwell 2001, Appendix A). Three of the potentially significant archaeological sites are located in areas identified for highway upgrades. Another 86 remain unevaluated. Two of the unevaluated sites are historic graves.

Native Americans have identified the entire Pahranagat Valley, once home to the Pahranagat Paiutes, as an important cultural landscape (DIRS 155826-Nickens and Hartwell 2001, all). Earlier studies with Native Americans identified the Coyote Springs area and the Arrow Canyon Range valley south of Pahranagat as places of cultural importance.

Operations. Operation of the Caliente intermodal transfer station and the highways along Caliente/Las Vegas heavy-haul truck route would transport spent nuclear fuel and high-level radioactive waste through several areas identified as culturally important to Native Americans. In addition, the route passes through approximately 1.6 kilometers (1 mile) of the Las Vegas Paiute Reservation, and the U.S. 93 segment passes near the Moapa Reservation.

6.3.3.2.3.6 Caliente/Las Vegas Route Occupational and Public Health and Safety

This section addresses potential impacts to occupational and public health and safety from upgrading highways and heavy-haul truck operations on the Caliente/Las Vegas route. Impacts from the associated intermodal transfer station in Caliente would be the same as those discussed in Section 6.3.3.2.1.

Highway Construction and Upgrades. Industrial safety impacts on workers from upgrading highways for the Caliente/Las Vegas route would be small (Table 6-105). The analysis evaluated the potential for impacts in terms of total reportable cases of injury, lost workday cases, fatality risks for workers, and traffic-related fatalities from commuting workers and the

Table 6-105. Impacts to workers from industrial hazards from upgrading highways along the Caliente/Las Vegas route.

Group and industrial hazard category	Construction[a]	Operations[b]
Involved workers		
Total recordable cases[c]	44	200
Lost workday cases	22	110
Fatalities	0.06	0.55
Noninvolved workers[d]		
Total recordable cases	2.6	11
Lost workday cases	1.0	4.3
Fatalities	0.003	0.01
Totals[e]		
Total recordable cases	47	210
Lost workday cases	23	110
Fatalities	0.06	0.56

a. Impacts are totals over about 46 months.
b. Includes impacts from periodic maintenance and resurfacing activities. Impacts are totals over 24 years.
c. Total recordable cases includes injury and illness.
d. The noninvolved worker impacts are based on 25 percent of the involved worker level of effort.
e. Totals might differ from sums due to rounding.

movement of construction materials and equipment. Table 6-106 lists the estimated fatalities from construction and commuter vehicle traffic.

Table 6-106. Estimated number of fatalities from construction material delivery vehicles and construction and operations worker commuting traffic for the Caliente/Las Vegas route for heavy-haul trucks.[a]

Activity	Kilometers[b]	Traffic fatalities	Vehicle emissions fatalities
Construction[c]			
Material delivery vehicles	41,000,000	0.7	0.09
Commuting workers	37,000,000	0.4	0.05
Subtotals	*78,000,000*	*1.1*	*0.13*
Operations[d]			
Commuting workers	200,000,000	2.0	0.26
Totals	***280,000,000***	***3.0***	***0.39***

a. Includes impacts from construction and operations of an intermodal transfer station.
b. To convert kilometers to miles, multiply by 0.62137.
c. Impacts are totals over about 46 months.
d. Impacts are totals over about 24 years.

Operations. Incident-free radiological impacts listed in Table 6-107 would occur during the routine transportation of spent nuclear fuel and high-level radioactive waste on the Caliente/Las Vegas route. These impacts would include those from transportation along the route and along railways in Nevada leading to the Caliente intermodal transfer station. The table includes the impacts of 1,079 legal-weight truck shipments from commercial sites that do not have the capability to load rail casks while operational.

Table 6-107. Health impacts from incident-free Nevada transportation for the Caliente/Las Vegas route heavy-haul truck implementing alternative.[a]

Category	Legal-weight truck shipments	Rail and heavy-haul truck shipments	Totals[b]
Involved workers			
Collective dose (person-rem)	38	1,400	1,400
Estimated latent cancer fatality	0.02	0.56	0.58
Public			
Collective dose (person-rem)	7	220	230
Estimated latent cancer fatality	0.003	0.11	0.11
Estimated vehicle emission-related fatalities	0.002	0.062	0.064

a. Impacts are totals for 24 years.
b. Totals might differ from sums of values due to rounding.

6.3.3.2.3.7 Caliente/Las Vegas Route Socioeconomics

This section describes potential socioeconomic impacts that would occur from upgrading highways along the Caliente/Las Vegas route and building an intermodal transfer station for heavy-haul truck transportation. The discussion includes impacts from the operation of an intermodal transfer station at Caliente and periodic resurfacing of the highways and the planned Las Vegas Beltway.

The analysis of socioeconomic impacts assumed that Clark County would secure a loan to advance the construction schedule of the portion of the Las Vegas Beltway that would be part of the Caliente/Las Vegas route. The analysis based the estimates of impacts on two sources of information from Clark County on the cost of building a section of the Beltway. These sources estimate that modifications to the Northern Beltway would cost between $43.6 million (DIRS 103710-Clark County 1997, p. 2-7) and $463 million (DIRS 155112-Berger 2000, p. 29) (about $43.6 to $463 million in 2001 dollars). DOE believes the actual impact will be between the two values. The loan to Clark County for $43.6 million or $463 million, at a real rate of 3 percent, with repayment of the loan starting in 2010 and lasting for 30 years, is

a part of the modeling to determine impacts to employment, population, real disposable income, and expenditures by State and local governments. (A *real* percentage rate is the premium paid in addition to the rate of inflation; a real rate plus the rate of inflation equals the nominal or quoted rate.) Clark County would repay the loan from tax revenues.

Highway Construction and Upgrades. Socioeconomic impacts from upgrading public highways for the Caliente/Las Vegas route, advancing the scheduled completion of a portion of the Las Vegas Beltway, and building an intermodal transfer station would be temporary, occurring over a short period and spread among the counties along the route. Employment for highway upgrades, excluding the Beltway, and construction of an intermodal transfer station would be about 832,000 worker-hours or 416 worker-years. The highway upgrades, excluding the Beltway, would cost $96.8 million, would take approximately 46 months, and would occur during the 48-month construction period anticipated for the Beltway. The analysis assumed that if DOE selected this route, Clark County would advance the construction schedule of the Beltway and would reconfigure the design to accommodate use by heavy-haul trucks. Constructing an intermodal transfer station would cost $25 million and require 18 months to complete. (Dollar values reported in this section are 2001 dollars unless otherwise stated.)

This section expresses values for socioeconomic measures (employment, population, real disposable income, Gross Regional Product, and State and local government expenditures) and for the potential impacts of change in those measures as a range of values. The first value refers to the outcome if the Beltway cost is $43.6 million; the second refers to the outcome if the cost is $463 million. DOE anticipates that the actual change would fall between the two values.

Employment

In the region of influence, increased employment of construction workers involved with upgrading the highways (including the Beltway) and with building an intermodal transfer station (direct workers) and other workers employed as a result of the economic activity generated by the project (indirect workers) would peak in 2008 at between 588 and 1,979 persons. The increase in employment in Clark County would be between 544 and 1,910 workers, Nye County would gain between 8 and 29 workers, and Lincoln County would gain between 36 and 40 workers. The increases in Clark and Nye Counties would be less than 1 percent of the employment baseline for each county. The increase in Lincoln County would be less than 2 percent of the County's employment baseline.

Population

Projected population increases in the region of influence that would result from construction work related to the Caliente/Las Vegas route would peak in 2009. During that year, population would be more than the baseline by between 500 and 2,002 individuals. The change in population for Clark County would be between 477 and 1,943 people, for Lincoln County between 13 and 17 people, and for Nye County between 10 and 42 people. The impacts from an increase in population as a result of increased employment opportunities would be less than 1 percent of each county's population baseline. Because the increases in population in each county would be so small and transient, impacts to schools or housing would be unlikely.

Economic Measures

Economic measures would rise during the construction of an intermodal transfer station and the upgrading of highways and the Las Vegas Beltway. The increase above the baseline in real disposable income of people in the region of influence would peak in 2008 at between $19.0 million and $65.3 million. The region-wide increase in Gross Regional Product would peak in 2008 at between $33.1 million and $104.1 million. Increased State and local government expenditures resulting from highway upgrades and the intermodal transfer station construction project would peak in 2009 at between $1.7 million and $6.6 million. The Gross Regional Product, real disposal personal income, and expenditures

by State and local governments would rise by less than 1 percent in Clark, Nye, and Lincoln Counties. (Dollar values reported in this section are in 2001 dollars unless otherwise stated.)

Transition to Operations. In the region of influence, employment of Caliente/Las Vegas heavy-haul truck route workers and indirect (support) workers would decrease by 516 to 2,123 when construction of the intermodal transfer station and highway upgrades (including the Beltway portion) ended in 2009. Clark County would lose between 506 and 2,087 of these jobs, Nye County would lose between 5 and 27 of these jobs, and Lincoln County would lose between 4 and 9 jobs. DOE anticipates that some of the displaced workers would move into operational positions on the Caliente/Las Vegas route while others would find other work in the State. While this project would lose jobs, employment projections for the State estimate approximately 1.4 million jobs in 2010, or about 999,500 in the region of influence.

Operations. If DOE selected this route, operations at an intermodal transfer station near the City of Caliente and use of heavy-haul trucks would begin in 2010 and continue until 2033. A workforce of 26 would be required for the intermodal transfer station. Direct employment for heavy-haul truck operations, including escorts, would be 120 workers.

To analyze impacts of operations for a Caliente/Las Vegas heavy-haul truck route, DOE considered three activities: operation of the intermodal transfer station, operation of heavy-haul trucks, and maintenance of highways and the Las Vegas Beltway.

Employment and Population

Employment associated with an intermodal transfer station and heavy-haul trucks would remain relatively level throughout operations. Total employment in the region of influence attributable to operation of a Caliente/Las Vegas route would average about 209 workers. The analysis determined that about 110 workers would come from Clark County, about 11 from Nye County, and 88 from Lincoln County. The impact on population would be about 359 additional residents in the region. About 224 persons would live in Clark County, about 25 in Nye County, and about 110 in Lincoln County. Additional employment and population for Lincoln County, which would experience the largest changes as a percentage of the baselines, would be about 3.3 percent of the employment baseline and 2.3 percent of the population baseline. These impacts would be within the range of historic changes in the county.

During the operational period of heavy-haul truck shipments, periodic road resurfacing would be needed. Employment (direct and indirect) in the region would increase by about 191 workers during the 2-year duration of resurfacing projects. DOE assumed that all the workers would come from Clark County-based employers. Overall, employment increases from periodic (every 8 years starting in 2016) highway resurfacing projects would be less than 1 percent of the baseline for Clark County. Given the short duration of each resurfacing project, there would be no perceptible change in the region's population. Employees hired to resurface the highways and their families are included in the averages discussed below.

The net changes to employment and population from three operational activities associated with a Caliente/Las Vegas route during the 24 years of operations can be summarized. If the cost of the beltway was approximately $43.6 million, there would be an incremental increase of 225 jobs in the region of influence, 119 in Clark County, 13 in Nye County, and 93 in Lincoln County. This impact would be less than 1 percent of the baselines in Clark and Nye Counties, and 3.5 percent of the baseline in Lincoln County. If the cost of the beltway reaches $463 million, employment in the region of influence, while continuing to grow to approximately 1,137,000 positions, would have 108 fewer employment opportunities. Clark County would have 211 fewer positions, but Nye County would gain 10 positions and Lincoln County would gain 93 positions during the operations phase. Impacts to the baselines in Clark and Nye Counties would be less than 1 percent, but the change in Lincoln County would be 3.4 percent of the baseline.

The region of influence would experience a growth in population of an additional 440 residents, 292 in Clark County, 29 in Nye County, and 119 in Lincoln County. This impact would be less than 1 percent of the baselines in Clark and Nye Counties, but 2.5 percent of the baseline in Lincoln County. Because the impacts would be small in Clark and Nye Counties, impacts to housing or schools would be unlikely. The increase in population in Lincoln County would include an annual average of 32 school-age children. There would be no impact in the housing market in Lincoln County given the chronically high vacancy rate in housing (see Chapter 3, Section 3.1.7.4).

Economic Measures

Changes in employment and population would drive changes in economic measures attributable to the project. If the final loan amount was $43.6 million, real disposable income in the region of influence would rise throughout operations, starting at $3.9 million in 2010 and increasing to $14.7 million in 2033. The average would be $8.6 million. Gross Regional Product would also rise during operations; the average annual increase would be $13.4 million. State and local government expenditures would also increase with an average annual increase of $2.3 million. Increases to real disposable income, Gross Regional Product, and government expenditures would be less than 1 percent of the baselines for Clark and Nye Counties. The changes in Lincoln County would be more visible. Changes in real disposable income ($3.0 million annually) and government expenditures for the County would be approximately 2.5 and 3.0 percent of the baselines, respectively. The projected change in Gross Regional Product ($5.6 million annually) for the County would be 3.9 percent of the baseline. These changes would be within the range of historic short-term changes for Lincoln County.

If the final loan amount was $463 million, growth in real disposable income in the region of influence would slow throughout the operations period as the loan is repaid. Starting at $5.3 million above the baseline in 2010 and declining to $26.8 million below the baseline in 2033, growth in real disposable income would decline by an average of $24.2 million, or 0.043 percent of the region of influence's baseline during the operations phase. Real disposable income in Lincoln County would increase by an average of $3.0 million. This change would represent 2.5 percent of the County's baseline. Increases in Gross Regional product would average $468,000 in Nye County and $5.5 million in Lincoln County. The increase in Nye County would be less than 1 percent, but the change represents 3.8 percent of the baseline in Lincoln County. The rate of growth in Gross Regional Product would decline by an average of $12.1 million in Clark County and $6.1 million in the region of influence. These impacts would be less than 1 percent of the applicable baselines. Expenditures by State and local governments attributable to the project would average $100,000 in Nye County and $1.2 million in Lincoln County. The increase in Nye County would be less than 1 percent of the baselines, but the increase in Lincoln County would be 3.0 percent of the baseline. Growth in expenditures by State and local governments would slow by an average of $1.3 million in Clark County, an impact of less than 1 percent of the County's baseline. As population growth slows, there would also be a slowing in the rate of tax revenue collected and a slowing in the rate of population growth that would require a given level of public services.

In addition, DOE analyzed a sensitivity case in which all Lincoln County socioeconomic impacts were assumed to occur only in the City of Caliente. Under this assumption, city population would rise by 3 percent during construction and by about 8.7 percent during operations. Employment would rise by about 11 percent during construction and about 12 percent during operations.

6.3.3.2.3.8 Caliente/Las Vegas Route Noise and Vibration

Section 6.3.3.1 discusses noise impacts common to all the heavy-haul truck implementing alternatives. This section focuses on the noise impacts that would be unique to the Caliente/Las Vegas heavy-haul truck implementing alternative.

Noise impacts of the Caliente intermodal transfer station would be the same as those discussed in Section 6.3.3.2.1.

Highway Construction and Upgrades. Construction activities for upgrading highways along the Caliente/Las Vegas route would occur on all sections with the exception of the section of I-15 between its intersection with U.S. 93 and the planned North Las Vegas Beltway. North Las Vegas, the Towns of Caliente and Indian Springs, and the small rural communities of Crystal Springs, Ash Springs, and Alamo would fall within the 2,000-meter (6,600-foot) region of influence for construction noise. The potential number of inhabitants would be highest near the greater Las Vegas area. There are scattered residences along U.S. 93 in the Pahranagat Valley.

Because the shipments would pass through a large population area, there would be a potential for noise impacts along the route.

Operations. The Caliente/Las Vegas route would by pass mostly rural communities, and would be confined to established highway systems. Three public schools in Alamo are in the region of influence along U.S. 93 and the Indian Springs school is in the region of influence along U.S. 95. However, the incremental noise increase due to the infrequent heavy-haul truck shipments would not alter the existing noise environment. Because the proposed intermodal transfer station would be on the western edge of Caliente and traffic would not travel through the city, traffic noise impacts in Caliente would be inconsequential. Estimated noise levels (1-hour average sound levels) in Crystal Springs, Ash Springs, Alamo, Indian Springs and Cactus Springs would increase by 0.3 to 2.0 dBA due to heavy-haul truck traffic. A potential *receptor* is the public school in Indian Springs, which also serves students from Cactus Springs. The Indian Springs school is about 300 meters (980 feet) south of U.S. 95. The incremental contribution of heavy-haul trucks at this distance from the highway would not be perceptible. Background traffic noise levels would be greatest along I-15 and the North Las Vegas Beltway, reducing the potential for heavy-haul truck noise to produce adverse effects to public receptors during daylight hours. No historic buildings would be affected by ground vibration. No sensitive ruins of cultural significance have been identified along this route.

On the Caliente/Las Vegas heavy-haul truck route, U.S. 93 passes within 5 kilometers (3 miles) of the Moapa Reservation. However, the distance from the highway to the reservation makes noise impacts unlikely. The estimated mean 1-hour increase in traffic noise due to heavy-haul trucks in this area would be 0.1 dBA over existing background traffic noise (DIRS 155825-Poston 2001, all). This increase would not be perceptible on the reservation. The heavy-haul truck route on U.S. 95 passes through about 1.6 kilometer (1 mile) of the Las Vegas Paiute Reservation. Because of the relatively large traffic volume on U.S. 95, the increase in traffic noise due to heavy-haul trucks in this area would not be perceptible (DIRS 155825-Poston 2001, all).

6.3.3.2.3.9 Caliente/Las Vegas Route Aesthetics

The Caliente intermodal transfer station would be near the entrance to Kershaw-Ryan State Park. Park visitors would receive short-term visual impacts from construction activities. In addition, park visitors could be affected by noise from construction activities that could lessen their recreational experience. These short-term impacts would exist only during construction.

During operation of the intermodal transfer station, noise and lighting probably would be discernible from Kershaw-Ryan State Park, especially during night operations, and would probably detract from the recreational experience. The use of shielded and directional lighting would limit the amount of viewable light from outside the facility operational area.

6.3.3.2.3.10 Caliente/Las Vegas Route Utilities, Energy, and Materials

Section 6.3.3.1 discusses utilities, energy, and materials impacts that would be common to the heavy-haul truck implementing alternatives. This section focuses on the utilities, energy, and materials impacts that would be unique to the Caliente/Las Vegas heavy-haul truck implementing alternative.

Highway Construction and Upgrades. The construction of the Caliente intermodal transfer station would produce the same utilities, energy, and materials impacts as those discussed in Section 6.3.3.1.

Table 6-108 lists the estimated quantities of primary materials for the upgrade of Nevada highways for the Caliente/Las Vegas route. These quantities would be unlikely to be large in relation to the southern Nevada regional supply capacity (see Section 6.3.3.1).

Table 6-108. Utilities, energy, and materials required for upgrades along the Caliente/Las Vegas route.

Route	Length (kilometers)[a]	Diesel fuel (million liters)[b]	Gasoline (thousand liters)	Asphalt (million metric tons)[c]	Concrete (thousand metric tons)	Steel[d] (metric tons)
Caliente-Las Vegas	377	5.5	110	0.55	0.80	21

a. To convert kilometers to miles, multiply by 0.62137.
b. To convert liters to gallons, multiply by 0.26418.
c. To convert metric tons to tons, multiply by 1.1023.
d. Steel includes rebar only.

Operations. Section 6.3.3.1 discusses the utilities, energy, and materials needs for the operation of an intermodal transfer station.

Fossil fuel that would be consumed by heavy-haul trucks during operations is discussed in Chapter 10, which addresses irreversible commitments of resources.

6.3.3.2.4 *Sloan/Jean Route Implementing Alternative*

The Sloan/Jean route (Figure 6-25) is about 188 kilometers (117 miles) long. Heavy-haul trucks and escorts leaving a Sloan/Jean intermodal transfer station would enter I-15 at the Sloan interchange. The trucks would travel on I-15 to the exit to the southern portion of the proposed Las Vegas Beltway, and then travel northwest on the beltway. They would leave the beltway at U.S. 95, and travel north on U.S. 95 to the Mercury entrance to the Nevada Test Site. The trucks would travel on Jackass Flats Road on the Nevada Test Site to the Yucca Mountain site. The travel time (vehicle in motion plus periodic short stops for inspections) associated with a Sloan/Jean route would be as much as 4 hours.

The three potential areas for an intermodal transfer station southwest of Las Vegas are between the existing Union Pacific sidings at Sloan and Jean. One area is on the east side of I-15, south of the Union Pacific rail underpass at I-15, and has an area of 3.3 square kilometers (811 acres). The second, which has an area of 3.1 square kilometers (758 acres), is south of the Sloan rail siding along the east side of the rail line. A third area is south of the second, directly north of the Jean interchange on I-15, and has an area of 1.0 square kilometer (257 acres). The estimated life-cycle cost of constructing and operating an intermodal transfer station and of operating heavy-haul trucks along the Sloan/Jean route would be about $444 million in 2001 dollars.

The following sections address impacts that would occur to land use; air quality; biological resources and soils; hydrology including surface water and groundwater; cultural resources; occupational and public health and safety; socioeconomics; noise and vibration; and utilities, energy, and materials. Impacts that would occur to aesthetics and waste management would be the same as those discussed in Section 6.3.3.1 and are, therefore, not repeated here. Section 6.3.4 discusses the potential for transportation activities to cause environmental justice impacts in Nevada.

6.3.3.2.4.1 Sloan/Jean Route Land Use and Ownership

This section describes anticipated land-use impacts that could occur from the construction and operation of the Sloan/Jean intermodal transfer station, upgrades of highways, and heavy-haul truck operations over

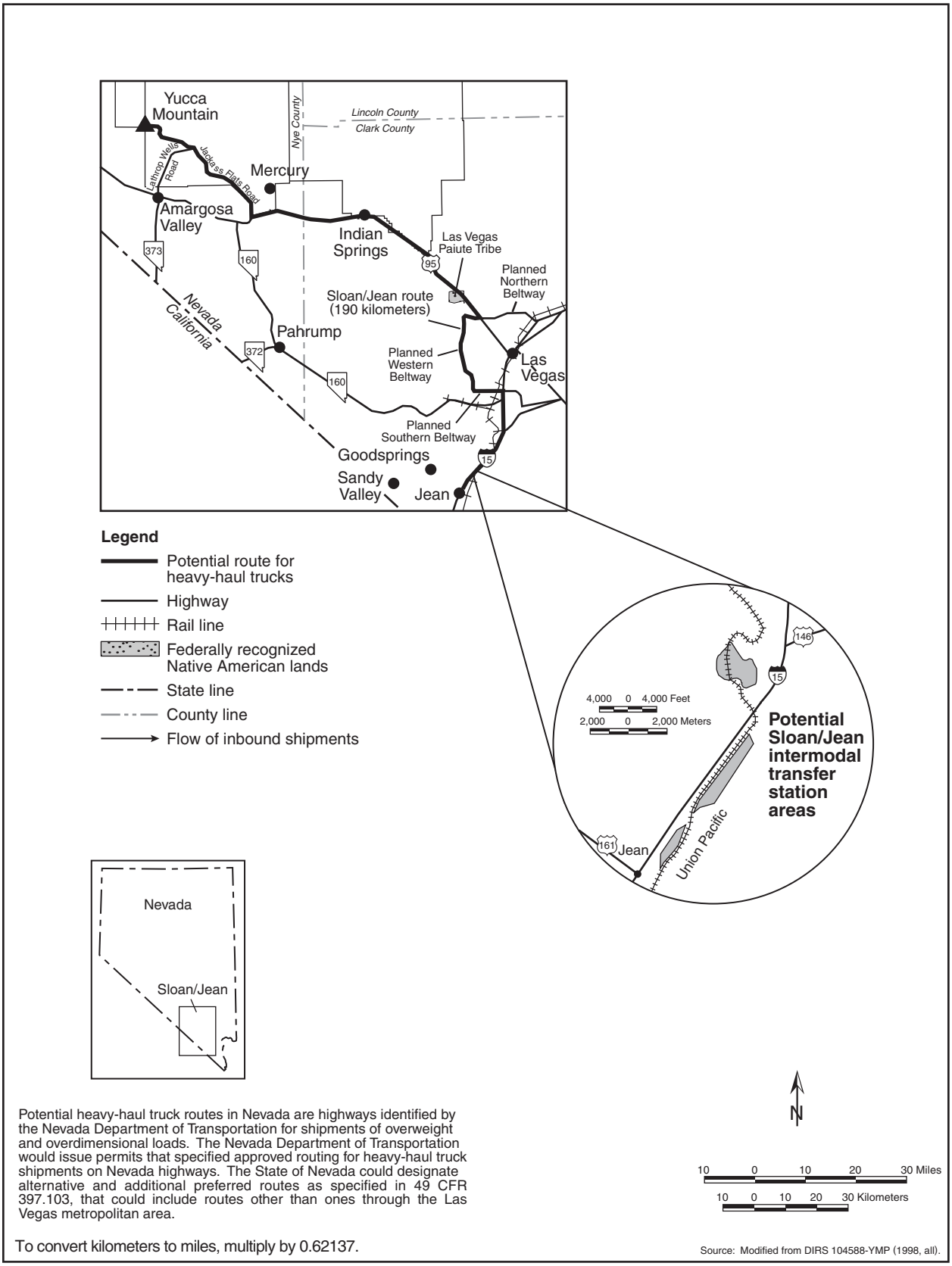


Figure 6-25. Sloan/Jean heavy-haul truck route.

the Sloan/Jean route. Chapter 3, Section 3.2.2.2.1, describes the Sloan/Jean intermodal transfer station site and the associated truck route.

Highway Construction and Upgrades. At the Sloan/Jean intermodal station area there could be potential impacts related to the current use of the land. All three Sloan/Jean candidate sites are on land administered by the Bureau of Land Management. The northernmost area is in the Spring Mountain grazing allotment and the Ivanpah Valley desert tortoise area of critical environmental concern. The Bureau of Land Management has designated land east of the railroad as a gravel pit (community pit), but that land has not been worked; the area is open to fluid mineral leasing but closed to mining claims. The two southern areas are in the Jean Lake grazing allotment, a special recreation management area, and an area designated as available for sale or transfer. Both southern areas are open to fluid mineral leasing and mining claims (DIRS 104993-CRWMS M&O 1999, p. 21).

This route would require the disturbance of approximately 0.63 square kilometer (160 acres) of land from road upgrades and additional construction activities. Table 6-109 summarizes these disturbances.

The land under consideration would require a change in ownership from the Bureau of Land Management to DOE. The amount of land transferred from grazing lands to DOE would result in a small loss to the allotment. Because of the relatively small size of the required parcels and their proximity to roads and railways, the removal of these lands would be unlikely to affect livestock management. A potential loss of desert tortoise habit is discussed below. The amount of land that would be removed from fluid mineral leases is small and would be unlikely to cause long-term impacts. If the areas under consideration were already under lease, DOE would negotiate a transfer with the lessee.

Table 6-109. Land disturbances along the Sloan-Jean heavy-haul truck route.

Disturbance	Area disturbed[a] (square kilometers)[b]
Haul road disturbed area	0.47
Aggregate plants	0.08
Road widening	<0.01
Passing lanes	None
Truck turnouts	None
Fortymile Wash new road	0.04
Overnight stops	None
Mercury turnoff road	0.03
Total disturbed area	0.63

a. Numbers approximate due to rounding.
b. To convert square kilometers to acres, multiply by 247.1.

The removal of land from a special recreational management area would be unlikely to cause long-term impacts to recreational activities. The Bureau of Land Management could make other lands available for the recreational activities. This would require agreement between the Bureau and DOE before the start of construction activities.

The potential loss of lands from the Bureau of Land Management land sale/transfer program could cause a loss of potential tax revenue.

The Sloan/Jean route would require considerable improvements at the interchange with I-15. A small amount of land would be converted for the improvements. Section 6.3.3.1 discusses other impacts on land use from upgrading Nevada highways for use by heavy-haul trucks.

Operations. There would be no direct land-use impacts associated with the operation of the Sloan/Jean intermodal transfer station or the Sloan/Jean route other than those described in Section 6.3.3.1.

6.3.3.2.4.2 Sloan/Jean Route Air Quality

This section describes anticipated nonradiological air quality impacts from construction activities and operations of an intermodal transfer station, highway construction and upgrades, and operation of heavy-haul trucks along the Sloan/Jean route. Such impacts would result from releases of criteria pollutants,

including nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter (PM_{10}) (see Section 6.3.3.1).

Carbon monoxide and PM_{10} are of particular interest along the Sloan/Jean route because some construction activities as well as heavy-haul truck transport would occur through the Las Vegas Basin, which is classified as a serious nonattainment area for those pollutants, and because the intermodal transfer station locations would be in or near the nonattainment area. PM_{10} and carbon monoxide emissions from intermodal transfer station construction are presented in Section 6.3.3.1. Intermodal transfer station construction emissions would be 15 percent of the PM_{10} General Conformity threshold and would be 2.3 percent of the carbon monoxide General Conformity threshold level.

Highway Construction and Upgrades. Section 6.3.3.1 discusses the methods used to estimate the air quality impacts for the construction activities for the Sloan/Jean route. PM_{10} emissions would be an estimated 41 metric tons (45 tons) per year, including estimated emissions for the accelerated construction activities of the southern and western portions of the Las Vegas Beltway. These emissions would be 64 percent of the General Conformity threshold level. Carbon monoxide emissions for highway construction and upgrades would be an estimated 33 metric tons (36 tons) per year. These emissions are 36 percent of the carbon monoxide General Conformity threshold level.

Operations. Section 6.3.3.1 discusses the air quality impacts associated with the operation of a locomotive at the Sloan/Jean intermodal transfer station. In addition to these operations, the operation of heavy-haul trucks along the Sloan/Jean route would affect the Las Vegas Valley air basin. Air quality impacts from heavy-haul trucks to this air basin would be small [0.62 metric tons (0.68 ton) per year of carbon monoxide] with emissions at less than 1 percent of the General Conformity threshold level. These emissions would result from 11 round trip heavy-haul trucks traveling through the Las Vegas Valley each week.

6.3.3.2.4.3 Sloan/Jean Route Hydrology

DOE anticipates limited impacts to surface water and groundwater during upgrades to Nevada highways so they could accommodate daily use by heavy-haul trucks. This section discusses these impacts as well as those from the construction and operation of an intermodal transfer station and operation of trucks on the Sloan/Jean route. Section 6.3.3.1 discusses the hydrology impacts that would be common to all of the heavy-haul truck implementing alternatives. This section focuses on the hydrology impacts that would be unique to the Sloan/Jean heavy-haul truck implementing alternative.

Surface Water

Section 6.3.3.1 discusses the impacts to surface water from the construction and operation of an intermodal transfer station and upgrades to highways. The common impacts discussed in Section 6.3.3.1 apply to surface water along the Sloan/Jean route.

The assessment in Appendix L compares what is known about the floodplains, springs, and riparian areas at the three candidate intermodal transfer station sites (see Sections L.3.2.8 and L.4.2.2). The southernmost of the three locations for the Sloan/Jean station appears to be, at least in part, in a 100-year flood zone of a normally dry drainage channel (see Section L.3.2.8).

Groundwater

Highway Construction and Upgrades. Section 6.3.3.1 discusses the impacts to groundwater from the construction of an intermodal transfer station. Upgrades to the Sloan/Jean route would not require any water wells. The road upgrades would require an estimated total of about 9,200 cubic meters (8 acre-feet) of water (DIRS 104917-LeFever 1998, all). Options for obtaining this water would be to lease temporary water rights from individuals along the route, ship water from other permitted resources by truck (about 500 truckloads) to construction sites, or use a combination of these two actions.

Operations. Section 6.3.3.1 discusses impacts to groundwater from the operation of an intermodal transfer station, highway maintenance, and heavy-haul truck routes.

6.3.3.2.4.4 Sloan/Jean Route Biological Resources and Soils

Section 6.3.3.1 discusses impacts to biological resources from the construction and operation of an intermodal transfer station and upgrades to highways that would be common to all intermodal transfer stations and routes. This section discusses the construction- and operations-related impacts that would be unique to the Sloan/Jean intermodal station and route.

Highway Construction and Upgrades. Potential Sloan/Jean intermodal transfer station site locations are between the existing Union Pacific rail sidings at Sloan and Jean. The dominant land cover type in these areas is creosote-bursage (DIRS 104593-CRWMS M&O 1999, p. 3-36). The land cover type at the site is extensive in the region (DIRS 104593-CRWMS M&O, pp. C1 to C5).

The three sites that DOE is considering for a Sloan/Jean intermodal transfer station are in the range of the desert tortoise, but none of the areas are critical habitat for the tortoise (50 CFR 17.95). The construction site would disturb approximately 0.2 square kilometer (50 acres) of tortoise habitat. The likelihood of tortoise death or injury due to construction activities would be small if DOE moved tortoises in the immediate area to a safe habitat. The pinto beardtongue (classed as sensitive by the Bureau of Land Management) occurs in two of the proposed locations of the Sloan/Jean intermodal transfer station (DIRS 104593-CRWMS M&O 1999, p. 3-36). If one of these sites was selected, DOE would conduct pre-activity surveys for this plant species and would avoid disturbance of occupied areas if possible. The construction of an intermodal transfer station at a site southwest of Sloan could cause bighorn sheep to avoid the eastern edge of their winter range in that area. There are no springs or other areas that could be classified as wetlands at the location of the intermodal transfer station (DIRS 104593-CRWMS M&O 1999, p. 3-36).

Predominant land cover types in nonurban areas along the route are creosote-bursage and Mojave mixed scrub (DIRS 104593-CRWMS M&O 1999, p. 3-36). The regional area for each vegetation type is extensive. Because areas disturbed by upgrade activities would be in or adjacent to existing rights-of-way and the areas have been previously degraded by human activities, impacts would be small.

The only threatened or endangered species that occurs along the route is the desert tortoise. Desert tortoise habitat occurs throughout the length of the route (DIRS 103160-Bury and Germano 1994, pp. 57 to 72; 50 CFR 17.95). Construction activities could kill or injure desert tortoises; however, losses would be few because construction would occur only on the right-of-way and desert tortoises are uncommon along heavily traveled roads (DIRS 103160-Bury and Germano 1994, Appendix D, p. D12). Four other special status species occur along this route (DIRS 104593-CRWMS M&O 1999, p. 3-36), but construction activities would be limited to the road and adjacent areas; occupied habitat would not be destroyed and these species should not be affected.

This route would not cross any areas designated as game habitat and there are no springs or wetlands near the route. The corridor crosses a number of ephemeral streams that may be classified as waters of the United States. DOE would work with the State of Nevada and the U.S. Army Corps of Engineers to minimize impacts to these areas, and obtain individual or regional permits, as appropriate (DIRS 104593-CRWMS M&O 1999, p. 3-36). Impacts to soils would be transitory and small and would occur only along the shoulders of existing roads.

Operations. Impacts from operations would include periodic disturbances of wildlife from activities at the intermodal transfer station and additional truck traffic along this route. Trucks probably would kill individuals of some species but losses would be few and unlikely to affect regional populations of any species. No additional habitat loss would occur during operations. Impacts to soils would be small.

6.3.3.2.4.5 Sloan/Jean Route Cultural Resources

Highway Construction and Upgrades. A total of 59 archaeological and historic sites have been recorded along existing highway rights-of-way along the Sloan/Jean heavy-haul truck route (DIRS 155826-Nickens and Hartwell 2001, Appendix A). None of these occur in areas along roads that would require upgrades.

There are seven archaeological sites near the location of the Sloan/Jean intermodal transfer station, none of which has been evaluated for potential eligibility for the *National Register of Historic Places* (DIRS 155826-Nickens and Hartwell 2001, Appendix A). Possible unrecorded sites in the intermodal transfer station location include some associated with the original construction of the railroad in the early part of the 20th century, such as construction camps. The location of the "Last Spike," where the last two segments of the railroad were joined occurs in the vicinity of the site.

No areas or sites of cultural importance to Native Americans have been identified along the Sloan/Jean route or at the intermodal transfer station location, although field studies have not been completed. The route follows a portion of U.S. 95 that passes though approximately 1.6 kilometers (1 mile) of the Las Vegas Paiute Reservation.

Operations. Based on currently available information, operation of a Sloan/Jean intermodal transfer station and heavy-haul truck route would have no impacts on cultural resources.

6.3.3.2.4.6 Sloan/Jean Route Occupational and Public Health and Safety

This section addresses potential impacts to occupational and public health and safety from upgrading highways and heavy-haul truck operations on the Sloan/Jean route. Impacts from the associated intermodal transfer station in the Sloan/Jean area would be the same as those discussed in Section 6.3.3.1.

Highway Construction and Upgrades. Industrial safety impacts on workers from upgrading highways for the Sloan/Jean route would be small (Table 6-110). The analysis evaluated the potential for impacts in terms of total reportable cases of injury, lost workday cases, fatality risks for workers, and traffic fatalities related to commuting workers and the movement of construction materials and equipment. Table 6-111 lists the estimated fatalities from construction and commuter vehicle traffic.

Operations. The incident-free radiological impacts listed in Table 6-112 would occur during the routine transportation of spent nuclear fuel and high-level radioactive waste on the Sloan/Jean route. These impacts would include transportation along the Sloan/Jean route as well as transportation along railways in Nevada leading to the Sloan/Jean intermodal transfer station. The table includes the impacts of 1,079 legal-weight truck shipments from commercial sites that do not have the capability to load rail casks while operational.

Table 6-110. Health impacts to workers from industrial hazards from upgrading highways along the Sloan/Jean route.

Group and industrial impact category	Construction[a]	Operations[b]
nvolved workers		
Total recordable cases[c]	23	120
Lost workday cases	11	66
Fatalities	0.032	0.33
Noninvolved workers[d]		
Total recordable cases	1.4	6.8
Lost workday cases	0.5	2.5
Fatalities	0.001	0.007
otals[e]		
Total recordable cases	24	130
Lost workday cases	12	68
Fatalities	0.033	0.34

a. Impacts are totals over about 48 months.
b. Includes impacts for periodic maintenance and resurfacing. Impacts are totals over about 24 years.
c. Total recordable cases includes injury and illness.
d. The noninvolved worker impacts are based on 25 percent of the involved worker level of effort.
e. Totals might differ from sums due to rounding.

Table 6-111. Estimated number of fatalities from construction material delivery vehicles and construction and operations worker commuting traffic for the Sloan/Jean route for heavy-haul trucks.

Activity	Kilometers[a]	Traffic fatalities	Vehicle emissions fatalities
Construction[b]			
Material delivery vehicles	17,000,000	0.3	0.04
Commuting workers	21,000,000	0.2	0.03
Subtotals	*38,000,000*	*0.5*	*0.06*
Operations[c]			
Commuting workers	120,000,000	1.2	0.16
Totals	*170,000,000*	*1.7*	*0.23*

a. Includes impacts of construction and operation of an intermodal transfer station.
b. To convert kilometers to miles, multiply by 0.62137.
c. Impacts are totals over about 48 months.
d. Impacts are totals over 24 years.

Table 6-112. Health impacts from incident-free Nevada transportation for the Sloan/Jean heavy-haul truck implementing alternative.[a]

Category	Legal-weight truck shipments	Rail and heavy-haul truck shipments[b]	Totals[c]
Involved workers			
Collective dose (person-rem)	38	1,200	1,200
Estimated latent cancer fatalities	0.02	0.48	0.50
Public			
Collective dose (person-rem)	7	330	340
Estimated latent cancer fatalities	0.003	0.17	0.17
Estimated vehicle emission-related fatalities	0.002	0.19	0.19

a. Impacts are totals for 24 years.
b. Includes impacts to workers at an intermodal transfer station.
c. Totals might differ from sums of values due to rounding.

6.3.3.2.4.7 Sloan/Jean Route Socioeconomics

This section describes potential socioeconomic impacts that would occur from upgrading highways along the Sloan/Jean route, constructing and modifying a section of the planned Las Vegas Beltway, and building an intermodal transfer station for heavy-haul truck transportation. The discussion includes the impacts of operating an intermodal transfer station near Sloan/Jean in Clark County and of periodic resurfacing of the highways and Beltway.

This analysis of socioeconomic impacts assumed that Clark County would secure a loan to advance the construction schedule of the portion of the Las Vegas Beltway that would be part of this heavy-haul truck route. DOE estimates that modifications to the Beltway would cost between $98.1 million and $790 million in 2001 dollars. DOE believes the actual impacts would be between the two values. A loan to Clark County for $98.1 or $790 million, at a real rate of 3 percent, with repayment of the loan starting in 2010 and lasting for 30 years, is a part of the modeling to determine the impacts to employment, population, real disposable income, and expenditures by State and local governments. (A *real* percentage rate is the premium paid in addition to the rate of inflation; a real rate plus the rate of inflation equals the nominal or quoted rate.) Clark County would repay the load from tax revenues. DOE assumes most repayment funds would be from sources the county has already identified for completion of the Beltway.

Highway Construction and Upgrades. Socioeconomic impacts from upgrading existing highways for a Sloan/Jean route, advancing the construction schedule for modifying a portion of the planned Las Vegas Beltway, and building an intermodal transfer station would be temporary, occurring over a short period and spread among the counties along the route. Upgrading the existing highways for the route, excluding the Beltway, would cost about $20.8 million and would require 48 months to complete. The upgrades to

the highways would occur during the 48-month construction period for the planned portion of the Beltway. Building an intermodal transfer station would cost $25 million and would require 18 months. If DOE selected this route, the Beltway construction schedule would be advanced to accommodate use by heavy-haul trucks. (Dollar values reported in this section are in 2001 dollars unless otherwise stated.)

Employment

The dynamics of specific construction projects include a period of brief, intense elevation in project-related employment, followed by an abrupt decrease in associated employment opportunities as construction workers move to other projects. Composite employment would peak in the region of influence in 2008, would be approximately 631 workers under the $98.1 million beltway assumption, and would peak in 2006 at 3,047 workers under the estimated $790 million assumption. Under the entire range of estimated costs, Clark County would provide more than 96 percent of the workers. Clark County would gain 620 to 2,996 workers, Nye County would gain 9 to 42 workers, and Lincoln County would gain 2 to 9 workers. The change in employment for Clark, Nye, and Lincoln Counties would be less than 1 percent of their employment bases.

Population

Population increases in the region of influence due to a Sloan/Jean route and intermodal transfer station construction would peak in 2009. During that year, the incremental increase in population for Clark County would be between 532 and 2,951 people, for Lincoln County between 1 and 8 people, and for Nye County between 11 and 63 people. The impacts due to an increase in population as a result of increased employment opportunities would be less than 1 percent of each county's population baseline. Because the increases in population in each county would be small and transient, impacts to schools or housing would be unlikely.

Economic Measures

Economic measures would rise during the construction of an intermodal transfer station, upgrading of highways, and construction of the Las Vegas Beltway. The increase in real disposable income of people in the three-county region of influence would peak in 2008 at between $20.7 million and $97.3 million. The region-wide increase in Gross Regional Product would peak in 2008 at between $36.0 million and $153.2 million. Increased State and local government expenditures would peak in 2009 at between $1.8 million and $9.9 million. The Gross Regional Product, real disposal personal income, and expenditures by State and local governments would rise by less than 1 percent of the baselines in Clark, Nye, and Lincoln Counties. (Dollar values reported in this section are in 2001 dollars unless otherwise stated.)

Transition to Operations. In the region of influence, employment of Sloan/Jean heavy-haul route workers and indirect (support) workers would decrease by 588 to 3,240 when construction of the intermodal transfer station and highway upgrades (including the Beltway portion) ended in 2009. Clark County would lose between 579 and 3,185 of these jobs, Nye County would lose between 8 and 45 of these jobs, and Lincoln County would lose between 1 and 10 jobs. DOE anticipates that some of the displaced workers would move into operational positions on the Sloan/Jean route while others would find other work in the State. While this project would lose jobs, employment projections for the State estimate approximately 1.4 million jobs in 2010, or about 999,500 in the region of influence.

Operations. Operations at an intermodal transfer station near Sloan/Jean and the use of heavy-haul trucks would begin in 2010 and last until 2033. A workforce of about 26 would be required for the intermodal transfer station. Direct employment for heavy-haul truck operations over a Sloan/Jean route, including shipment escorts, would be about 66 workers. The analysis assumed that operations workers would reside in Clark County.

To analyze the impacts of using a Sloan/Jean route for heavy-haul trucks, DOE considered three activities: the operation of the intermodal transfer station, the operation of heavy-haul trucks, and the maintenance of the highways and the Las Vegas Beltway.

Employment and Population

Employment associated with the operations of an intermodal transfer station and heavy-haul trucks would remain relatively level throughout operations. Total employment in the region of influence attributable to a Sloan/Jean route would average about 107 workers. The analysis determined that about 99 workers would come from Clark County and that the other 8 would come from outside the three-county region of influence. The impact on the population from operating heavy-haul trucks and the intermodal transfer station would be about 129 additional residents in the region. About 127 persons would live in Clark County, and 2 people would live in Nye County. Lincoln County would be unlikely to gain population as a result of this project. Impacts to the employment and population baselines in Nye and Clark Counties would be less than 1 percent. Because the incremental increase in population would be so small, impacts to housing and the school system would be unlikely.

Because of the periodic need to resurface highways used by heavy-haul trucks, construction maintenance employment would increase in the years during which these projects occurred. Resurfacing would occur from 2016 to 2017, 2024 to 2025, and 2032 to 2033. During these years, total employment in the region of influence would increase by about 42 jobs and decline as maintenance activities ended. DOE assumed that virtually all of the resurfacing construction employees would come from Clark County employers. Employment changes from periodic (every 8 years) highway-resurfacing projects would be less than 1 percent of the employment baseline in Clark County. The employees who would resurface the roads and their families are included in the employment and population averages discussed above for the operations phase.

Net changes to employment and population from all three portions of the Sloan/Jean heavy-haul truck route during the 24-year operations phase can be summarized. There would be an incremental average annual increase of 48 positions in the region of influence, 47 of them in Clark County if the cost of the beltway was approximately $98.1 million. The region of influence would experience a growth in population of 53 additional residents, 48 in Clark County and 5 in Nye County. These impacts would be less than 1 percent of the baselines. If the cost of the beltway reaches $790 million, the region of influence, while continuing to grow to an average of 1.1 million jobs, would have 501 fewer employment positions. Approximately 497 of these positions would have been in Clark County. Population, which is driven by employment opportunities, would be affected. The region of influence (with an average of 2.29 million residents) would have 1,016 fewer residents, all of whom would have lived in Clark County. Impacts to populations and employment at the upper range of the cost estimates would be less than 1 percent of the baselines.

Economic Measures

Changes in employment and population would drive changes in economic measures attributable to the project. If the final loan amount was $98.1 million, real disposable income in the region of influence would oscillate above and below the baseline throughout the operations period. The average would be $616,000 below the region of influence's $55.7 million average baseline. Gross Regional Product would rise during operations, with the average increase being $5.8 million. Annual State and local government expenditures would increase, with the average increase being $176,000. Increases to real disposable income, Gross Regional Product, and government expenditures would be less than 1 percent of the baselines for Clark, Nye, and Lincoln Counties.

If the final loan amount was $790 million, impacts would be more visible, but still less than 1 percent of the economic measure baselines for each county. Growth in real disposable income in the region of influence would slow throughout the operations period as the loan is repaid. Growth in real disposable

income would decline by an average of $54.7 million, or 0.0981 percent of the region of influence's baseline during the operations phase. Decreases in Gross Regional Product would average $26.3 million in the three-county region of influence. The decline in the growth rate would be less than 1 percent of each county's baseline. A slowing in expenditures by State and local governments attributable to the project would average $3.7 million annually region-wide. As population growth slowed, there would be slowing in the rate of tax revenue collected and a slowing in the rate of population growth that would require a given level of public services.

6.3.3.2.4.8 Sloan/Jean Route Noise and Vibration

Section 6.3.3.1 discusses noise impacts common to all the heavy-haul truck implementing alternatives. This section focuses on the noise impacts that would be unique to the Sloan/Jean heavy-haul truck implementing alternative.

Highway Construction and Upgrades. There are residences and commercial businesses near the three potential sites for an intermodal transfer station in the Sloan/Jean area. Construction noise would occur during daylight hours and would be a temporary source of elevated noise in the area. Nighttime noise impacts would be unlikely because construction activities would not occur at night.

For the Sloan/Jean route, southern and western Las Vegas, the Town of Indian Springs, and the small rural community of Jean would be within the 2,000-meter (6,600-foot) region of influence for construction noise. Construction activities would occur on all sections of the route with the exception of I-15 between its interchange at Sloan and the planned Southern Las Vegas Beltway. Because the number of inhabitants of the region of influence would be high because the route passes around the greater Las Vegas area and includes other small rural communities and towns, there is a potential for construction noise impacts.

Operations. The presence of residences and commercial businesses near the Sloan/Jean location would make an intermodal transfer station a potential source of more noise complaints than the more remote locations. However, because operational noise in the vicinity of Sloan/Jean would not be much higher than the levels associated with most other light industrial areas, noise impacts would be unlikely. Railcar switching would be the greatest source of noise.

The Sloan/Jean route would use established highway systems with wide shoulders. The incremental noise increase due to the infrequent heavy-haul truck shipments would not alter the existing noise environment. Estimated noise levels (1-hour average sound levels) at Indian Springs and Cactus Springs would increase by about 0.4 dBA [at 15 meters (50 feet) from the road] due to heavy-haul truck traffic. Background traffic noise levels would be greatest along the western Beltway, reducing the potential for heavy-haul truck noise to cause adverse effects to public receptors during daylight hours. A potential receptor is the public school in Indian Springs which also serves students from Cactus Springs. The Indian Springs school is about 300 meters (980 feet) south of U.S. 95. The incremental contribution of heavy-haul trucks at this distance from the highway would not be perceptible. No historic buildings would be affected by ground vibration. No sensitive ruins of cultural significance have been identified along this route.

The Sloan/Jean heavy-haul truck route on U.S. 95 passes through about 1.6 kilometer (1 mile) of the Las Vegas Paiute Reservation. Because of the relatively large traffic volume on U.S. 95, the increase in traffic noise due to heavy-haul trucks in this area would not be perceptible (DIRS 155825-Poston 2001, all).

6.3.3.2.4.9 Sloan/Jean Route Utilities, Energy, and Materials

Section 6.3.3.1 discusses utilities, energy, and materials impacts that would be common to all the heavy-haul truck implementing alternatives. This section focuses on the utilities, energy, and materials impacts that would be unique to the Sloan/Jean heavy-haul truck implementing alternative.

Highway Construction and Upgrades. The construction of the Sloan/Jean intermodal transfer station would have the same utilities, energy and materials impacts as those discussed in Section 6.3.3.1.

Table 6-113 lists the estimated quantities of primary materials for the upgrade of Nevada highways for the Sloan/Jean route. These quantities are not likely to be very large in relation to the southern Nevada regional supply capacity (see Section 6.3.3.1).

Table 6-113. Utilities, energy, and materials required for upgrades along the Sloan/Jean route.

Route	Length (kilometers)[a]	Diesel fuel (million liters)[b]	Gasoline (thousand liters)	Asphalt (million metric tons)[c]	Concrete (thousand metric tons)	Steel[d] (metric tons)
Sloan/Jean	188	1.7	27	0.24	0.1	2.3

a. To convert kilometers to miles, multiply by 0.62137.
b. To convert liters to gallons, multiply by 0.26418.
c. To convert metric tons to tons, multiply by 1.1023.
d. Steel includes rebar only.

Operations. Section 6.3.3.1 discusses utilities, energy, and materials needs for operation of an intermodal transfer station.

Fossil fuel that would be consumed by heavy-haul trucks during operations is discussed in Chapter 10, which addresses irreversible commitments of resources.

6.3.3.2.5 *Apex/Dry Lake Route Implementing Alternative*

The Apex/Dry Lake route (Figure 6-26) is about 183 kilometers (114 miles) long. Heavy-haul trucks and escorts would leave the intermodal transfer station at the Apex/Dry Lake location and enter I-15 at the Apex interchange. The trucks would travel south on I-15 to the exit to the proposed northern Las Vegas Beltway and travel west on the Beltway. They would leave the Beltway at U.S. 95, and travel north on U.S. 95 to the Mercury entrance to the Nevada Test Site. The trucks would travel on Jackass Flats Road on the Nevada Test Site to the Yucca Mountain site. The travel time (vehicle in motion plus periodic short stops for inspections) associated with an Apex/Dry Lake route would be as much as 4 hours.

The potential sites for the Apex/Dry Lake intermodal transfer station are in areas northeast of Las Vegas between the Union Pacific rail sidings at Dry Lake and at Apex. Three areas are available for station siting (see Figure 6-26). The first area is directly adjacent to the Dry Lake siding. This area is large [3.5 square kilometers (880 acres)] and has flat topography; it is adjacent to and west of the Union Pacific line. The second is a smaller area [0.18 square kilometer (45 acres)] on the same side of the Union Pacific mainline, a short distance northeast of the 3.5-square-kilometer area, and also has flat topography. This area would be used in combination with a portion of the first area. These two areas are bounded by hills to the north and by a wash and private land to the south. The third area, which is east of I-15, is adjacent to and west of the Union Pacific line and south of where the line crosses I-15. This location has an area of 0.96 square kilometer (240 acres). Because this area is between the Dry Lake and Apex sidings, the construction of an additional rail siding would be necessary. The estimated life-cycle cost to build and operate an intermodal transfer station and to operate heavy-haul trucks along the Apex/Dry Lake route would be about $387 million in 2001 dollars.

The following sections address impacts that would occur to land use; air quality; hydrology; biological resources and soils; cultural resources; occupational and public health and safety; socioeconomics; noise and vibration; and utilities, energy, and materials. Impacts to hydrology from the construction and operation of an intermodal transfer station, upgrading of highways, and operation of heavy-haul trucks on an Apex/Dry Lake route would be the same as those discussed in Section 6.3.3.2.4 for a Sloan/Jean route.